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TQL, A CASE STUDY OF IMPLEMENTATION INTO THE OPERATIONAL FLEET

by

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TQL, A Case Study of Implementation
into the Operational Fleet

by

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ABSTRACT

In August of 1990, the CNO released a memorandum to all flag officers to bring Total Quality Leadership (TQL) to the fleet. This Thesis is a case study of how an operational command goes about adopting the philosophies of TQL. Discussion of Dr. W.E. Deming's management philosophies and the Navy's Process Improvement Model are presented as background information. The case study presented is offered as a guide for implementation to the operational fleet, as all organizations or commands are unique in many respects. The development of this case and the theories behind TQL have shown one overwhelming factor to be present in all successful TQM/TQL implementations; "Commitment from top management is essential for the philosophy to be successful."

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I. TOTAL QUALITY LEADERSHIP A CASE STUDY

A. INTRODUCTION

In a message dated 13 August 1990, the Chief of Naval Operations (CNO) Admiral F.B. Kelso,II, stated:

> The growth which characterized the eighties will not continue into the nineties...We need something to take up the slack, and that something is Quality. Combat readiness is the Navy's product....I want us to structure an effective effort to improve quality in the navy which makes sense to our people, helps them get the job done properly and helps us all manage our resources better...The management philosophy that is being applied at our shore based establishments of quality controlled management is called "Total Quality Management" (TQM). This philosophy, taught in Japan by Dr. W.E. Deming, has been credited with many of the dramatic successes of the Japanese industrial production and their revolutionary improvements in quality. I want to continue the Navy's leadership in the shore establishments and expand it to include the operating forces... Our approach for the operating forces will be called "Total Quality Leadership" (TQL), because of the unique role that the Navy leadership plays in developing and implementing our operational objectives. Since TQM is a management philosophy, we need to adopt it's approach and techniques to the Navy's operational environment. It's process, procedures and "products" [REF 1:p 1].

It is this statement on which this thesis is based. The Department of the Navy (DON) has adopted this "new" management philosophy and is now in the process of implementation. The following case study covers the beginning phase of the implementation of TQL into the operational fleet.

B. BACKGROUND

The subject of the case study is Patrol Wing Ten, located at NAS Moffett Field, CA. The study was conducted from October 1991 through May of 1992. It was within this period that the Wing Commander, Captain D. C. Hefkin, chose to start the implementation of TQL into his own organization as a model for the fleet squadrons under his command. The study will focus on the process by which the command began it's journey into this new leadership philosophy and document the processes that it went through.

C. OBJECTIVES

It is the objective of this thesis is to develop a case study which will provide the following information: 1. A starting point for the operational squadron to begin it's own implementation of TQL; 2. A test case to show that the TQL philosophy of management can and will work in an operational environment; 3. An illustration of the use of TQL process management to improve an area of concern within the organization. The area of Temporary Additional Duties (TAD) will be explored as a test case for the tools used in the application of TQL.

D. THE RESEARCH QUESTION

The question that is to be presented is one that is based on the above objectives. This thesis is a case study and it is the intent of the author to provide sufficient documentation on which the following question can be answered;

> Through the application of TQL, can an organization better define its product and provide this product to the customer at a higher quality and reduced cost than the current system?

The answer to this question may not be known by the completion of this thesis. The change an organization must undergo to implement the TQL philosophy is not one that will occur overnight. This is a change in the entire culture of the organization, a paradigm shift to a philosophy that is not compatible with our current managerial paradigms. A second question will be: How does one go about shifting paradigms and transition the organization to this philosophy of TQL?

E. LITERATURE REVIEW AND METHODOLOGY

This case study is based on prior studies conducted on Navy shore based establishments. These studies document the first successes of TQM/TQL in the Navy. The Navy Personnel Research and Development Center (NPRDC), at San Diego, developed the Navy's TQL model and applied it to the Naval Aviation Depot North Island and Alameda along with the Naval Supply Center San Diego. NPRDC published the results of their study along with the Navy's model for TQL in December 1988. The overwhelming successes that were generated through this paradigm shift are the foundation on which the CNO based the August 1990 memorandum and the push to bring TQL to the fleet. The success stories of TQM/TQL are not limited to the Navy. There are several case studies on TQM in the private sector.

Mary Walton has published a new book, entitled "The Deming Model at Work."1991. In this book she provides case studies on corporations that have experienced great successes with TQM.

F. ORGANIZATION OF STUDY

The case study is divided into three distinct sections. Section one (chapters II-III) will deal with explanations of the Deming Model, the Navy Model. The second section (chapter IV) will provide the documentation of the process of implementation of the Navy's Model at Wing Ten. This will include a discussion of the formulation of the Executive Steering Committee (ESC) and its role in the organization along with a Quality Management Board (QMB) that was formed to look at the process of TAD and their recommendations to the ESC. The final section (chapter V) will provide recommendations for the implementation of TQL into the operational fleet. Appendix C provides an additional application of TQL to an operational process.

II. THE DEMING METHOD

A. BACKGROUND

1. Education

The revolutionary management philosophy that has brought Japanese industry from total devastation to leadership in the world markets is that of Dr. W. Edward Deming. Dr. Deming's philosophy is based on statistical theory to improve quality. Though Dr. Deming's formal education is in physics, in which he received his PhD. from Yale University, his emphasis of study has been in statistical process control. It was in the mid 1930's, while working for the Department of Agriculture, that he was introduced to Dr. Shewhart[1], who had developed new techniques to bring processes into what he referred to as "Statistical Control" [REF 2:p 7]. Shewhart's work looked at random variation in monitoring a workers tasks. His approach was to set upper and lower control limits on the output so that any output that fell outside the limits could be studied and corrected, thus improving workers ability to produce output within the control limits. It is on Shewhart's theories of quality control that Dr. Deming has based his work.

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[1] Dr. Walter Shewhart developed the concept of quality management through the application of statistics to determine if the output of a process is in statistical control. He is also the creator of the Deming cycle or PDCA as it is referred to in DON. It was on this work that Deming has based his work.

2. Deming at Work

In 1940, Deming's sampling techniques were applied to the 1940 census. During this time Deming demonstrated that statistical controls could be used in monitoring of industrial processes as well as clerical (service) operations. Deming is quoted as saying " We did a great many things that were novel and new." It is this new philosophy that Deming would later take to American industry during WWII. Firms such as General Electric and others that were involved in the production of war time goods applied the theories of statistical control to improve quality and reduce production time. With this increase in quality, the cost of rework and scrap also decreased. As the war came to an end and American industry returned to peace time production, they became the world leaders in all markets; there was no competition. The United States was the world's industrial base. Because of this lack of competition, along with American management's lust for profit, the theories of W. Taylor became the norm. Taylor's theory was and is referred to as "Scientific Management." Quality became an end process. The emphasis was on the numbers, and rework and scrap could be covered by the profits.

In Mary Walton's, book "The Deming Management Method", Deming relates one of the great lessons he learned: "Without pressure from management for quality, nothing would happen....He would not make that mistake again."[1]

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[1] The mistake that Deming is referring to is that he had taught SPC to the process owners and did not have the commitment from top management. American management did not have the long term commitment to quality that TQM requires. The emphasis was on the short term and that of profit. This is evident in the switch to Taylor's methodologies.

3. Deming in Japan

In 1950, a group of engineers and scientists, known in Japan as The Union of Japanese Scientists and engineers (JUSE), contacted Dr. Deming and asked him to come to Japan to conduct a series of seminars on Statistical Quality Control (SQC). It was during this seminar that Deming noted in his book; "I had a sense of deja vu. I was talking to the wrong people" [REF 2:p 60]. Enthusiasm for this management philosophy would not last in Japan if he did not reach the right people. Deming felt the top management of Japan must be behind this movement if it were to succeed. Through contacts he had made, Dr. Deming was able to meet with Kei-dan-ren, an association of Japan's top executives.

In his seminars, Deming relates what he told this group of Japan's 21 leading industrialists;

> You can produce quality. You have the method for doing it. You have learned what quality is. You must carry out consumer research, look toward the future and produce goods that will have a market years from now...I told them to work with the vendors and to work on instrumentation....I said, you can never produce quality with junk that comes in.

It is at this point in his seminars that Dr. Deming states what is felt as one of the important rules of his method. " The consumer is the most important part of the production line." In his method, the goal of the producer is to know his customer. Know what he needs now and in the future, then look at your process to get the product to them. Make improvements and bring the process into statistical control, continue to

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methodologies.

In her book,"The Deming Management method" Mary Walton relates a case example that Deming offered;

> One year ago a camera factory made 200 cameras per month; now they are making 400 and hope to increase to 500. This is with no increase in workers or hours. Simply better quality control.

4. Deming in the United States

In 1980, some thirty years since Deming first introduced his methods of SQC to Japan, the movement was catching on. On July 24, 1980, Dr. Deming and his philosophies of management were re-introduced to the American public. The introduction came in the form of a television documentary on NBC called "IF JAPAN CAN...WHY CAN'T WE?" During the telecast, Deming stated;

> If you get gains in productivity only because people work smarter,not harder, that is total profit...it will multiply several times...I think people expect miracles. American management thinks they can just copy from the Japanese. But they do not know what to copy.

It was this statement that was the key in bringing Dr. Deming to Ford Motor Co. and others. Deming would only come to these with this commitment from top management, Deming was confident that the introduction of his philosophy would succeed. Deming continues to conduct seminars throughout the United States delivering a message of opportunity for American industry to regain both domestic and world markets with quality products and service. It is his style or philosophy of management that has been adopted by the United States Navy. Deming's approach to management is discussed in the remainder of this chapter.

B. DEMING'S APPROACH TO MANAGEMENT

1. The Chain Reaction for Quality

To understand how an improvement in quality can affect a process, we must first understand the process. In generic terms, a process can be defined as a series of actions or steps to accomplish a task. A process may also be referred to as a chain reaction. Each step in the process builds on the preceding step; value is added at each step or action. Therefore, if any step or action in a defined process is modified or deleted, each subsequent step is affected. Figure 1 illustrates how quality improvement affects a process [REF 3:p 3].

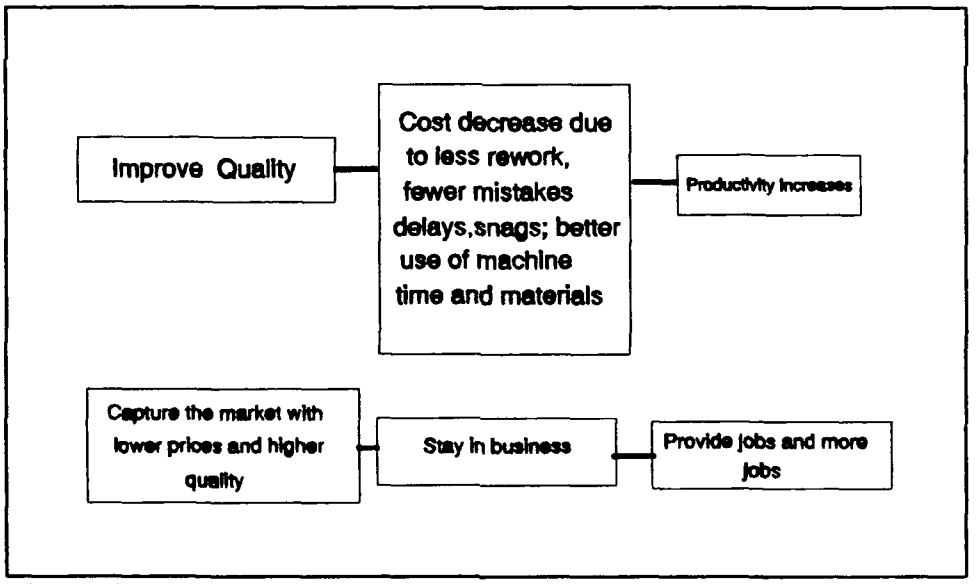

Figure 1 Deming Chain Reaction Diagram

This example illustrates what is at the heart of deming's approach to management, that improvements in quality are the key to success. However, the current paradigms of management do not lend themselves to this chain reaction.

Deming seminars promote a shift in paradigms to accomplish "Quality Improvement." This new philosophy is based on the interaction of three critical areas of the Deming philosophy (see FIG 2) [REF 4:p 64].

The remainder of this chapter is dedicated to a brief explanation of these critical areas.

Deming's Approach to Management[1]

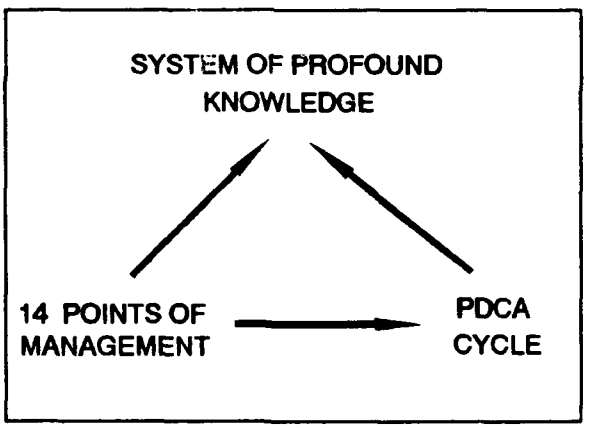

Figure 2 The Deming Model

[1] This diagram was presented as part of the Navy's Senior Leadership Seminar, which is conducted to educate the senior military and civilian personnel on TQL.

2. System of Profound Knowledge

In the "Deming Library" tapes, Deming responded to a question concerning what knowledge a manager must possess. He answered, "...Knowledge...Profound knowledge." It is this critical area that is the essence of Deming's work. Deming's system of profound knowledge consists of systems theory, statistical theory, psychology (of individuals, society and how change affects individuals and organizations) and finally theory of knowledge. It is these points that can be seen throughout Deming's 14 points for management and the Plan, Do, Check, Act (PDCA) cycle.

a. Systems Theory

Deming defines a system as "...A series of functions or activities...within an organization that work together for the aim of the organization" [REF 5:p 12]. A major concern in TQM is that of sub-optimization. The effects of sub-optimization can lead to the failure of a system or the entire organization. Some of the specific aspects of this are improper use of resources, emphasis on the short term and adversarial internal competition. It is only though strong leadership that sub-optimization can be avoided. Deming offers the following attribute that a leader must possess; "..A leader must understand the meaning of the system and how the work of the group is to support the aims of the organization" [REF 5:p 12].

b. Statistical Theory

Through the application of statistical methods a process can be monitored and in turn provide information on which management can make decisions. All processes have an output and this output can be measured. The most common measurement is the mean (or average) of a process. There is also another factor that is more important and revels a great deal of information. This is the variation (spread) of the process with respect to the mean. Variation can be sub-divided into two distinct areas.

(1) Common Causes. Causes that are inherent in the process over time, affect everyone working in the process, and affect all outcomes of the process [REF 6].

(2) Special Causes. Causes that are not in the process all the time or do not affect everyone, but arise because of specific circumstances [REF 6].

It is special cause variation that is most easily detected through the statistical analysis of a process. The tools that allow us to monitor processes will be presented in Appendix A.

The characteristics of a process can be described in statistical terms as being in control or not. A system is determined to be in control if all special cause variations are removed from the process. The area of process improvement is when there is a reduction of common cause variation.

This will be never ending because variation is inherent in all process.[1] Thus, a system can always be in a state of continuous improvement.

c. Psychology of Individuals, Society, Learning and Change

When management is asked what their most valued asset is, the response will be people. Thus, there exists a need for management to know how to manage this most valued asset. Through knowledge of psychology in individuals, society, learning and change, management has the tools necessary to provide guidance and direction. It is this knowledge that must be translated into leadership. To be effective and produce quality, management must become leaders of their employees and not figure heads or micro-managers.

d. Theory of Knowledge

The theory of knowledge can be broken down into four major points. First, theory is required to advance knowledge. Second, management requires prediction which is based on knowledge. Three, knowledge is obtained using scientific methods. Finally, managers must understand the theory of total quality [REF 4:p 80]. It is the additive value of these four points that constitutes knowledge. Management, as well as labor, must have knowledge to perform the assigned tasks. It is the 14 points of management that Deming offers to guide management towards a system of profound knowledge.

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[1] Shewhart observe this phenomenon in the early 1930's. Deming relates this in "Out of The Crisis" 1986.

3. 14 Points of Management

Through the years, Deming has been asked to provide an outline of what management must do to provide quality in their products. Deming offers the following 14 points or obligations for management to follow [REF 7:p 2-4][1].

1. Create and publish to all employees a statement of the aims and purposes of the company or other organization. The management must demonstrate constantly their commitment to this statement.

2. Adopt the new philosophy. We are in a new economic age. Western management must awaken to the challenge, must learn their responsibilities, and take on leadership for change.

3. Cease dependence on inspection to achieve quality. Eliminate the need for inspection on a mass basis by building quality into the product in the first place.

4. End the practice of awarding business on the basis of price tag alone. Instead, minimize the total cost.

5. Improve constantly and forever the system of production and service, to improve quality and productivity, and thus constantly decrease cost.

6. Institute training on the job.

7. Institute leadership. The aim of leadership should be to help people and machines and gadgets do a better job. Leadership of management is in need of overhaul, as well as leadership of production workers.

8. Drive out fear, so that everyone may work effectively for the organization.

9. Break down barriers between departments. People in research, design, sales, and production must work as a team, to foresee problems of production and in use that may be encountered with product or service.

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[1] These are the 14 points as of 1988. Deming applies continuous improvement to these points so they may change slightly.

10. Eliminate slogans, exhortations, and targets for the work force asking for zero defects and new levels of productivity. Such exhortations only create adversarial relationships, as the bulk of the causes of low quality and low productivity belong to the system and thus lie beyond the power of the work force.

11. (a) Eliminate work standards (quotas) on the factory floor. Substitute leadership. (b) Eliminate management by objective. Eliminate management by numbers, numerical goals. Substitute leadership.

12. (a) Remove barriers that rob the hourly worker of his right to pride of workmanship. The responsibility of supervisors must be changed from sheer numbers to quality. (b) Remove barriers that rob people in management and engineering of their right to pride of workmanship. This means, *inter alia,* abolishment of the annual or merit rating and of management by objective.

13. Institute a vigorous program of education and self-improvement.

14. Put everybody in the organization to work to accomplish the transformation. The transformation is everybody's job.

4. Plan, Do, Check, Act Cycle

The Plan, Do, Check, Act cycle (PDCA), is a management tool that can be used to improve a process. The cycle, as represented in Figure 3, is known in Japan as the Deming Cycle. This would lead one to belief that it is of deming's creation; however, it is not. The credit for this process is given by Deming himself to Walter A. Shewhart.[1]

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[1] The PDCA cycle that is displayed in FIG 3, is that of Dr. Shewhart. It is interesting to note that when Deming introduced this tool to the Japanese in 1950 he referred to it as the Shewhart Cycle and continues to do so. It was the Japanese that coined the term Deming Cycle (Out of the Crisis,1986.). The cycle is known today as the PDCA. The reference for the Shewhart work is the following; Walter A. Shewhart, Statistical Method from the Viewpoint of Quality Control (Graduate School, Department of Agriculture, Washington, 1939, Dover; 1986)p.45.

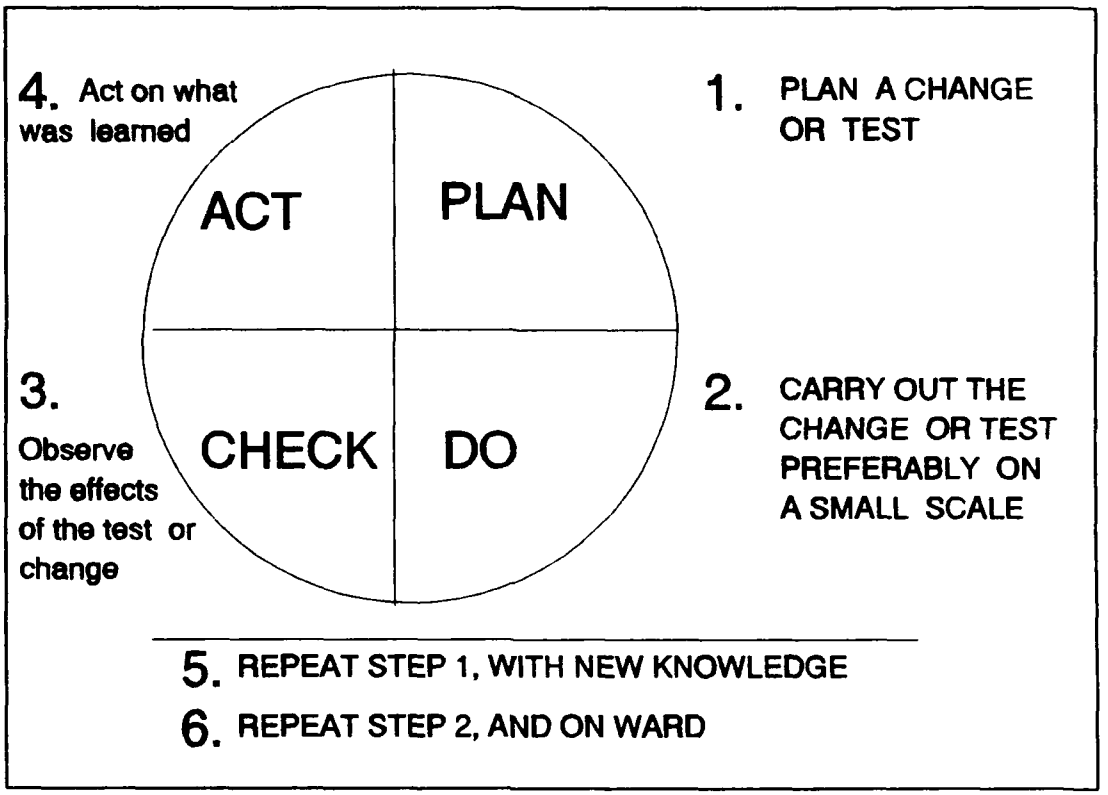

Figure 3 Shewhart Cycle (Plan, Do, Check, Act cycle)

The PDCA cycle is a system by which a process can be improved in a controlled environment. Traditional methods are more inclined to be reactionary to process problems. This is known as "fire fighting" or "shooting from the hip". Both these and other traditional methods for problem solving tend to emphasize the short term. This short term thinking will not lead to quality. The PDCA, therefore, is a method that is long-term in nature and is not reactionary; it can be classified as a "Total Quality" approach. It is this total quality that is seen in the phases of the cycle.

a. Phase 1: Planning

It is the Planing phase of the cycle that is the most important. The key is to identify what is to be improved, and plan what changes may lead to improvements. The second critical area is to determine what data is to be collected, by whom and when. The planning phase needs to be conducted by senior management. It is senior management the has the power to change process.[1]

b. Phase 2: Do

The Do Phase is the initial working phase. This phase will start the data collection to determine where the process is and where the planned changes should be implemented. Once the data has been analyzed, the planned changes will be implemented and monitored. After a set amount of time, the data should be re-collected to determine what happened after the changes. This will move the cycle into the check phase.

c. Phase 3: Check

The emphasis of the Check Phase is to determine if the changes that were implemented led to improvements of the process. There should also be a comparison to see if the improvements were of the same magnitude as planned. Now that there is knowledge of the process and the planned changes, the fourth phase can begin.

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[1]Managements control of a process or system can be defined as an 85-15 rule. This rule states that approximately 85% of process variation can only be controlled by management action on the system, no mater how good the workers are. Deming has estimated that this ratio is more along the lines of 94% to 6% [REF 4].

that there is knowledge of the process and the planned changes, the fourth phase can begin.

d. Phase 4: Act

The preceding three phases provided management with information on which a decision can be made. The Act Phase is where changes to the process are standardized and made apart of the process. Then, it is the responsibility of management to promote change within the work force and monitor the progress. Finally, the fifth and sixth phases of the cycle are there to provide for continuous improvement of the process.

C. SUMMARY OF CHAPTER

The purpose of this chapter was to give the reader a brief but solid background of Dr. Deming's work and of his methods for quality. The next chapter will provide the reader with the Department of the Navy's view of this model and then both will be used in a final analysis of the case that is presented.

III. THE NAVY TQL MODEL

With the release of the CNO memorandum in August of 1990, the DON started on the path of "Total Quality Leadership". As previously stated, commitment from top management is required for TQL to succeed. This memorandum is clear in it's content that the senior leadership of the Navy is committed to the philosophy of TQL.

The DON has been applying the TQM/TQL philosophies at shore based facilities for several years. A number of case studies are available documenting these efforts. It is in the operational fleet that the philosophy of TQL is in it's initial stages. The scope of this chapter is to outline the DON TQL model and provide a base line for implementation in the operational fleet.

A. EXECUTIVE STEERING GROUP (ESG)

In 1989, Secretary of the Navy, H. Lawrence Garrett,III, established the DON ESG. This steering group is comprised of 25 of the departments top leaders. The purpose of the ESG is to lead and guide the TQL transformation throughout the Navy and Marine Corps [REF 8:p 9]. In recognition of the fact that the ESG could not on it's own support this task, it sponsored and chartered the Quality Support Center (QSC) to develop and support the transformation to TQL. The QSC, through analysis of current shore activity applications of TQM, has developed the following model for adaptation into the DON.

B. PROCESS IMPROVEMENT MODEL (PIM)

The formal name for the QSC model is known as Process Improvement Model (PIM). It should not be thought of as the only way that TQL can be applied, but a guide for implementation and should be treated as such. The model deals with the development of a different organizational structure, it's role with the PDCA cycle and recommended strategies for success. Along with the QSC model, the CNO has published the "Navalized" 14 points of management.

The PIM is offered as a bridge between theory and practice [REF 9:p 5]. The PIM must be adapted to fit the individual organization and should be seen as a guideline to develop and pursue quality leadership in the organization.

1. Organizational Structure

The use of the PIM requires cooperation and coordination at all levels of an organization. The following organizational structure is presented as a way to manage personnel involved in process improvement [REF 9:p 5]. The organization should be configured in three distinct but interactive tiers: Executive Steering Committee (ESC), Quality Management Boards (QMB) and Process Action Teams (PAT).

a. Executive Steering Committee (ESC)

The ESC is comprised of the highest level of management in the organization. For a majority of operational commands, this would include the Commanding Officer, Executive Officer and Department Heads. The ESC has several clearly defined functions:

1. Development of the strategic goals of the command.

2. Publish a "Mission Statement" that clearly defines the mission of the organization and defines it's customers and goals.

3. Development of organizational "Guiding Principles". The ESC must outline the principles by which the mission of the command is to be achieved.

4. Lead the transformation by example.

5. Define and prioritize the goals of the command. Determine which will require process improvement.

6. Provide support and resources to accomplish process improvements.

7. Empower QMB's for process improvements.

8. Implement the recommended changes and ensure that they are standardized.

9. Educate the personnel of the changes and in the philosophy of TQL.

It is the ESC that will determine if TQL will be successful. The ESC must present a cohesive view towards all process improvements. As stated earlier, commitment from the top is essential for TQL.

b. Quality Management Boards (QMB)

The QMB is a permanent cross-functional team which is made up of mid-level managers. These managers are the owners of the processes. It is the responsibility of the QMB to relate the ESC goals to specific processes. The purpose of the board is to improve communication and cooperation by providing both vertical and horizontal "links" throughout the organization [REF 9:p 6].

The QMB has the following functions:

1. Responsible for process improvement activities.
2. Targets areas for improvement.
3. Defines indicators of quality improvement.
4. Charters Process Action Teams (PAT).
5. Identifies causes of variation.
6. Monitors performance of process changes.
7. Link between PAT and ESC.
8. Training of PAT members in statistical methods and TQL.

It is the QMB that drives the PIM. The responsibility of the QMB is one of organization and communication. The QMB is responsible for the organization of the processes into a logical priority list for improvement. The QMB must then communicate to the ESC the improved process with recommended changes.

c. Process Action Teams (PAT)

Process Action Teams are ad hoc in nature. They consist of the lowest level workers, the people who daily work the process. The rationale is that the PAT is composed of experts of the process, thus allowing for a greater understanding of the process and the ability to make rational changes for improvement.

The function of the PAT has the following characteristics:

1. Collect and summarize data gathered.
2. Collection of baseline information. This must include a flow diagram of the process.
3. Through application of Statistical Process Control (SPC) methods they are responsible for the collection of data.
4. Analyze data and identify special and common cause variations.
5. Propose changes for improvement with respect to common cause variation.
6. Remove or correct the special cause variation.
7. PAT's are by nature finite in duration.

The PAT is the heart of the PIM; it is their expert knowledge that allows the process to be improved in a long term manner.

The organizational structure discussed above does not alter the traditional chain of command. In the SECNAV paper on TQM/TQL he offers the following statement with regard to TQL and command;

> The term TQL, emphasizing "leadership", focuses attention on the new responsibilities of "Command," while recognizing that the existing responsibilities and accountability will not be compromised. TQL does not alter the traditional responsibilities of line officers or non-commissioned officers. The term is used to reflect the enhanced responsibilities of "Command."

This statement gives a clear definition of the interaction of the PIM organization and the chain of command. TQL can be viewed as an enhancement to the existing chain of command. TQL evolves the entire organization in the participation of the PIM and thus, improvement of quality in the organization.

2. The PDCA and PIM Interaction

There is a unique relationship between the PDCA cycle and the PIM. The PIM in simple terms directs the phases of the PDCA cycle and assigns responsibility and gives guidance for the application of the PDCA cycle. Figure 4 (page 26) shows the inter-relationship of the PIM and the PDCA cycle. The responsibility and guidelines for each phase is described in the following paragraphs.

a. Plan Phase

The plan phase is the responsibility of the ESC and QMB. The ESC is responsible for the stating of the goals of the organization and identifying areas or processes that require improvement. It is the QMB's responsibility to coordinate the process improvement activities. The QMB's as described earlier are the owners of the processes, therefore, they must have an understanding of the process flow. This understanding of the process allows the QMB to target areas of improvement and define the desired changes in outcomes. Appendix A, presents seven advanced SPC methods that can be used in the plan phase.

b. Do Phase

The Do phase is the primary responsibility of the PAT's with guidance from the QMB. It is extremely important that the QMB provide the PAT team with training in SPC tools and methods. The QMB must give a clear operational definition of when, where and why data is to be collected. The PAT is responsible for the collection and presentation of the data for the QMB. It will not be uncommon to have several PAT teams working in parallel on the same process. Appendix A outlines the seven basic tools of SPC that can be used in the phase.

c. Check Phase

The Check phase is the responsibility of the QMB but there is significant PAT involvement. This phase allows the QMB to analyze the data collected and gain new knowledge of the process. With this knowledge the QMB will be able to identify common cause and special cause variation. During this phase with process knowledge the QMB can develop changes to the process to be presented to the ESC during the Act phase.

d. Act Phase

The Act phase is just that, in this phase the QMB will present the proposed improvements to the process to the ESC. The QMB is responsible for presenting the process changes to reduce common cause variation and action taken to remove special cause variation. The ESC has the ultimate responsibility to implement the changes on a trial bases.

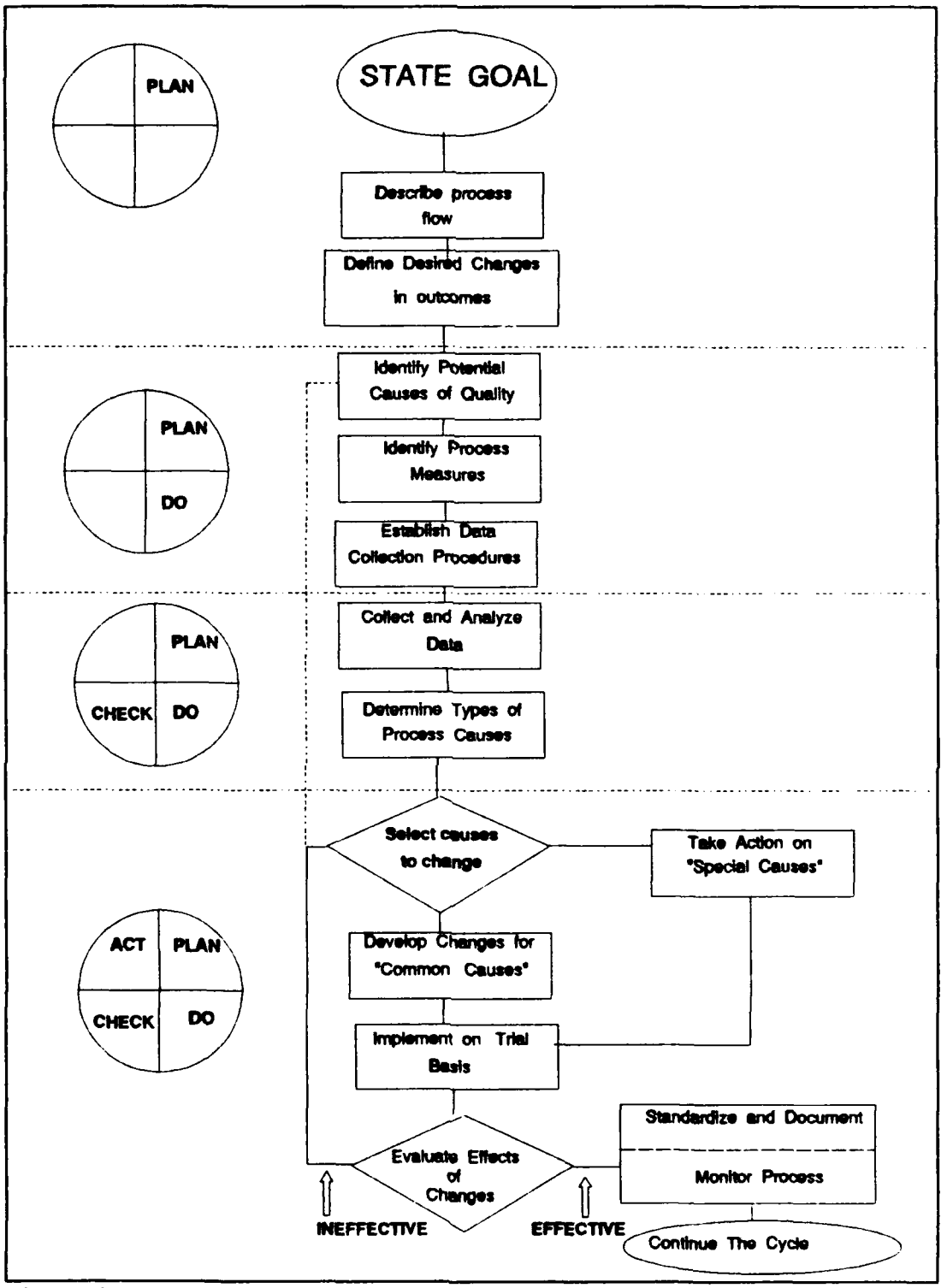

Figure 4 Process Improvement Model (PIM). [REF 9:p 4]

These changes must be standardized and the work force educated on the changes. During this phase the process will be monitored through the application of SPC tools developed during the Do phase and the effects of the changes evaluated. Once they have been evaluated and they are determined to be effective the changes will become a permanent part of the process. If the changes are ineffective then the ESC has the opportunity to return the cycle back to the Do phase and continue the cycle. The Act phase fosters the notion of "KAIZEN" or continuous improvement.

3. Strategies for PIM Success[1]

In reviewing the shore based activities the QSC offered the following statement in their conclusion with regards to TQM and success;

> The major impediments to the use of Process Improvement Model (PIM), and by extension, to the use of TQM are not likely to lie in the nature of the process under investigation, but rather to originate from inappropriate attitudes and practices of managers. Successful use of the PIM to improve an organizations products or services will be heavily affected by the ability of managers to adopt the concepts associated with TQM [REF 9:p 29].

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[1]The following section of this thesis is taken directly from the QSC's Process Improvement Model (PIM). The QSC's work and organization of the intended message can not be summarized with out losing the message and to state it in different terms would not do it justice.

The QSC developed the following list of recommendations for use of the PIM [REF 9:p 29].

1. Managers should understand the principles and techniques associated with TQM.
2. Managers should believe that they are capable of making significant changes in the way the organization does business.
3. Managers at all levels should have a shared perception that improvement in product or service quality is essential to their organizations mission.
4. Managers should agree that the TQM approach could significantly improve the products and services of the organization.
5. Managers should clearly define their responsibilities as well as the responsibilities of their subordinates in process improvement activities.

4. The Navalized 14 Points of Management

In closing his August memorandum, the CNO provided a "Navalized" version of Dr. Deming's 14 points of management. The essence of the philosophy is the same; however, these points are specific to the DON and reflect a leadership philosophy more than a management philosophy. The following is the draft 14 points as of 13 August 1990.

1. Understand the mission and principles of the Navy. Have a clear grasp of how your command supports the Navy's mission and how the principles apply to your day to day actions.
2. Quality is the essence of TQL. Insist on quality performance and material. Do the job correctly the first time.

3. Know your job. Analyze and understand every facet of your responsibilities and those of your people.

4. Words alone do not solve problems. Look first at the process and the system for faults and solutions, not the people. Improve the process, train the people.

5. Quality training is the key to success. People must be fully trained to do their jobs. You are never too senior to learn.

   * To do your best is not good enough unless you are properly trained to do the job.

6. Use analytical methods to understand and improve your jobs. Graphs and charts, properly used, are an invaluable tool in this effort.

7. We are a team. We must work together across departments and commands.

   * We must listen to the most junior people. All are charged with making the work place and quality of life better. All suggestions for improvement must be explained and action taken or rejected by the leadership.

   * The leader must provide those who suggest improvements and ideas with feedback as to what is being done with the suggestion or idea. The leadership will not necessarily adopt all ideas but the leadership must provide feedback on every suggestion.

8. Create an atmosphere of trust and open communication where everyone shares a sense of pride in their work.

   * Get fear out of the work place. Create an atmosphere in which people tell you what is wrong in order that it can be corrected.

   * Unless we recognize the problem we cannot improve.

   * We need to reward people who have the courage to tell us what they see that needs improvement so we can get better.

   * Good ideas and lessons learned must be transmitted and shared between departments and commands.

9. Inspect smarter. Inspections should be methods of learning and improvement rather than threatening events.

   * As all learn to do the job correctly the first and every time, the number of inspections will decrease.

10. Demand quality, not quotas.

    * Quality in the work place and in our lives is what we strive for.

    * If we get quality, all the other goals and quotas will follow.

11. Education and self-improvement are just as important as training. We must always get better.

    * Everyone must be involved in training and self education.

12. All improvements, big and small alike, are important.

13. Be a leader. Your job as a supervisor is to guide and assist your people.

    * The leader gets his people the tools and the training they need to do their job correctly.

    * It is the leader's responsibility to ensure his people are properly trained for the job before they are placed in a position of standing watch, starting a pump, lighting off a radar, firing a gun, loading a missile, etc.

14. All hands, from seaman to admiral, must learn and use TQL.

C. SUMMARY OF CHAPTER

The goal of this chapter was to give the reader an understanding of how Department of the Navy is adopting the TQM philosophy. It is clear that the senior leadership has taken this philosophy to heart. The commitment is not just in buzz words or memos but in action. Through the QSC the Navy has developed several courses in TQL that are available to commands. Referring back to the function of the ESC as discussed in the chapter we can see that the ESG is currently preforming these functions and thus, there is commitment from the top. This commitment is not only required by the QSC model but is essential to the Deming philosophy that the model is based on. With this commitment TQL is well on its way to providing quality in today's Navy. The remainder of the thesis is dedicated to a case study of the incorporation of TQL and the Process Improvement model into an operational command.

IV. CASE STUDY

The following case study is based on Patrol Wing Ten located at NAS Moffett Field. The case will document Wing Ten's transformation from the mainstream management philosophies to that of TQL. The time frame for the case is from October 1991 through May 1992 and its purpose is to provide an example of how an operational organization can adopt the TQL philosophy and shift the paradigms of management. The process by which Wing Ten adopted TQL is by no means the only way in which TQL can be introduced to the operational fleet. The case is presented as one guideline for implementation of TQL for commands and staffs to follow.

The Commander of Patrol Wing Ten, Captain D.C. Hefkin, introduced the wing to TQL by forming an ESC and empowering several QMB's. The case will cover the formation of the ESC and trace the progress of the QMB empowered to look at administrative processes. The case follows Wing Ten through the adoption of the Process Improvement Model and development of the mission statement and guiding principles. The data collected by the QMB and PAT teams is enclosed in Appendix B.

A. BACKGROUND OF WING TEN

Patrol Wing Ten serves as the operational and administrative commander for five patrol squadrons (VP) located at NAS Moffett Field. The Wing is responsible for scheduling and coordinating of operational tasking received from higher operational authority and arranging training events for the squadrons. The Wing also serves as the administrative link between the squadrons and Commander Patrol Wings Pacific (COMPATWINGSPAC). The Wing, like most operational staffs is functionally oriented and conducts daily operations via the chain of command. Appendix B contains the organizational diagram of Wing Ten's internal structure.

The management philosophy of Wing Ten prior to October 1991, was similar to a majority of operational staffs: a dynamic leader who is able to motivate his staff to sustained high levels of performance. Daily operational authority was delegated to department heads while responsibility was kept in the front office.

The Wing used a common philosophy of management to plan events or solve problem areas. Weekly department head meetings were held with the Commodore for the purpose of discussing issues. Department heads were then assigned responsibility for certain tasks and would develop a Plan Of Action & Milestones (POA&M) to accomplish the task. This style of management can be classified as Management By Objectives (MBO).

B. IMPLEMENTATION OF TQL

1. Formation of the ESC

In October 1991, Wing Ten began the transition of management philosophies from MBO to the philosophy of TQL. The Commodore, during this month, introduced TQL to his staff and designated a TQL coordinator. The coordinator was tasked with the responsibility of acquiring information and knowledge of TQL and presenting it to the ESC during their first meeting in November.

On 1 November 1991, the Wing Ten Executive Steering Committee (ESC) held it's first official session. The following personnel were appointed to the ESC:

1. Chairman of ESC.....Commodore
2. Vice - Chairman.....Chief Staff Officer
3. Members.....All Wing Department Heads

The first agenda for the Commodore was to establish new guidelines for how meetings would be held. The ESC would adopt a posture similar to that of a firms Board of Directors. The Commodore felt that rank should be left outside the meeting to allow for more open and frank discussion of issues. The second issue before the ESC was training. The ESC felt the need to dedicate the first few weeks to training on TQL. The ESC would meet on a weekly basis to hold training sessions and thereby increase the knowledge base of the ESC. The ESC adopted the use of the Navy's Process Improvement Model (PIM) to address of process improvement efforts.

With this adopted, the ESC moved to empower QMB's in the following areas. Each QMB was chaired by the respective department head:

1. Administrative
2. Operations
3. Training
4. Safety
5. Maintenance

The QMB's were tasked with developing a priority list of processes or areas needed quality improvements. The list provided to the ESC at the next meeting was long and ambitious. The ESC determined that the QMB's should limit the implementation of the PIM to processes that would not be complicated and would also lend themselves to TQL applications. At this point in the implementation process the ESC further outlined the agenda for the committee. The top priority was to develop a "Mission Statement" and a list of "Guiding Principles" to achieve this mission. Appendix B contains Wing Ten's Mission Statement and Guiding Principles. The ESC then set a standardized agenda for all further meetings. ESC meetings would be held on Thursdays and all members were to attend. No substitutions would be allowed. Guests were not allowed to attend ESC meetings unless the members agreed prior to the meeting. The ESC established that training of TQL to themselves as well as the entire wing was of the utmost priority. This training was the key to success in the eyes of the ESC members [REF 10].

One example of the dedication to training occurred in March 1992 when the ESC held a retreat at the Naval Postgraduate School. The retreat included all Commanding Officers, Executive Officers and Command Master Chief's of the Five VP squadrons at NAS Moffett Field. The ESC brought in an outside consultant and held two days of training on TQL and how to implement it. The ESC has incorporated TQL training into each of its meetings to increase knowledge of the members.

2. QMB Formation and Implementation

The QMB's that were empowered by the ESC were cross-functional in organization. QMB's would be chaired by the respective department head and members would consist of mid-level managers from other departments. The Administrative processes QMB will be used as an illustration of how a QMB goes about applying the PIM to improve processes under their control.

The QMB held it's first meeting on 20 November, 1991 (Minutes from this meeting are enclosed in Appendix B). The QMB members determined that the area of Temporary Additional Duty (TAD) requests needed improvement. The first action taken was to determine deficiencies in the process and possible quality improvement indicators to monitor the process improvements. On December 4, four Process Action Teams (PAT) were formed to gather data. Table I exhibits the PAT, area of responsibility and due date.

TABLE I

PAT TEAM	AREA OF RESPONSIBILITY	DATE
1	Standardize TAD request data tracking form	23 DEC
2	Identify weak areas in the system	23 DEC
3	Interview customers for feedback	TBA
4	Standardized process and recommend changes	TBA

On 23 December, the QMB convened to review the results of the PAT's. It was at this time that the QMB chair perceived that neither the QMB nor the PAT's had the required training to perform it's defined mission. The PAT's were dismissed of their duties and a policy change to the QMB charter was adopted. The new QMB policy was to conduct training for the QMB and then to follow on with PAT training as each was formed. Additionally, PAT teams would meet with the QMB prior to starting any collection process. At this meeting the PAT would receive a clear definition of the assigned task to ensure an understanding was held by all members involved in the improvement process. The QMB elected to hold only training meetings until February, 1992.

In February, the QMB convened with new knowledge of TQL and the PIM process. The QMB adopted to use the Five Stage Plan for process improvement [REF 7: 5.19]. The QMB reformed the PAT teams to coincide with the different stages of the plan.

3. PAT Actions

a. Stage One

The purpose of stage one is to understand the process. Common errors in the TAD process were identified by the QMB. The QMB then formed a PAT team to develop a flow chart of the process and collect data on the time required for a request to be processed by the system. The QMB also constructed a flow diagram from the middle management perspective. A second PAT team was formed to identify customer needs and concerns. A third PAT team was formed to standardize the process. Each of the PAT's were given two hours of training on the tools required for their specific mission prior to starting. Data from all QMB and PAT projects is located in Appendix B.

b. Stage Two

The purpose of stage two is to eliminate errors and/or non-value added steps. Through analysis of the data collected by the PAT teams in stage one, the following potential errors or quality problems were discovered.

1. Redundancy in routing steps and review process.
2. Lack of standardization in TAD request submissions.
3. Lack of timely submission of travel claims.

Pat teams were then formed to identify a means of eliminating these steps. As a result of the investigation, the following recommended changes to the TAD process were made.

1. Training to be provided on travel request submission to all personnel at check-in and update periodically.
2. The travel request form be changed to streamline and economize routing.
3. Unnecessary steps (involving checking of requests) be removed and incorporated instead at each approval level.

c. Stage Three

During stage three slack in the process is removed. This stage was used by the QMB to implement the recommended changes to the TAD process, thus allowing for a more stable and standardized process. These changes should eliminate the delays and errors in the system of processing TAD requests.

d. Stage Four and Five

The QMB combined the remaining two stages. Stage four is monitoring of the process, and stage five is to plan for the continuous improvement of the process. During the final meeting in May, the QMB recommended the changes to the ESC. The proposed changes will be implemented and used for a three month period.

In September of 1992, the same data would be collected and analyzed to determine if the changes were effective. The process would be continually monitored through customer feedback forms to ensure the process remained in control.

C. SUMMARY OF CASE STUDY

The purpose of this case was to show how, through the adoption of the TQL philosophy, an organization could improve the way it conducts business. The following is a point by point analysis of the strong and weak points of the case.

1. The designation of the TQL coordinator is the first strong point of the case. The ability for a large organization to implement TQL without a resident expert is almost if not impossible. The theories of TQM/TQL do not lend themselves to adaptation and implementation without such an expert.

2. The structuring of the ESC into a corporate board, and the elimination of rank inside the committee, is in keeping with Deming's point eight, "Drive out fear."

3. The emphasis on first developing the Mission Statement and Guiding Principles created a constancy of purpose to the entire organization. This is the first point Deming offers in his management philosophy.

4. Elimination of MBO at Wing Ten encompasses two of Deming's points: Point two, adopt the new philosophy and point 11(a), eliminate MBO.

5. Wing Ten made training their first priority. To have a successful transition to TQL, training must be paramount and of the highest quality. Wing Ten demonstrated this by bringing in experts to provide training.

6. The Five Stage Plan for process improvement was adopted by the QMB. This plan offered an outline for the QMB to follow and lead the PAT teams through the learning process. The Five Stage Plan coincides with the PIM.

7. Development of process flow diagrams was accomplished. In a seminar conducted in December of 1991, for the ESG, Deming stated the following: "Without knowledge of the process....You can not start to improve it.....to try to improve without this knowledge is tampering..."

8. The only weak area found in the case was the "False Start" of the QMB in November. This was a result of managements need to see results quickly. The key of TQL is to make decisions with knowledge. The QMB recognized this and conducted training to acquire the knowledge.

The adoption of the TQL philosophy is a long term commitment by management to provide quality in all of it's products or services. This case is a guideline to show how the adoption can take place in the operational fleet. Wing Ten's implementation is still in the infancy stages. The commitment of Commodore Hefkin to TQL, and the excitement generated through the command, is one of the major reasons for the current successes at Wing Ten. A concern that was not brought out in the case, but deserves mentioning, is the change of command which took place in March 1992. This event is common to all military commands and organizations. The question that was most often asked during this month was " Will we still be adopting TQL after the change of command?" The answer to this came quickly. The new Commodore, Captain R.M. Alford, continued the transition to TQL and has adopted all of the recommendations that have occurred to date.

V. CONCLUSIONS & RECOMMENDATIONS

A. CONCLUSIONS

When management philosophies are discussed and presented, they will all have merits and drawbacks for the given organization that they were tested on. The philosophy of TQL is no different. The question proposed by this thesis was:

> Through the application of TQL, can an organization better define its products and provide these to the customer at a higher quality and reduced cost than under the current system?

The case study along with the Process Improvement Model (PIM) provide the answer to this question. Through the adoption of the PIM and incorporating TQL into the organization, management made a commitment to change the way the organization conducts business. The tools of the PIM and TQL cannot help but better define the process of concern. The ability to trace the process via a flow diagram and reduce redundancy or delete non-value-added stages leads to a better designed process that cost less. This is but only one of many tools available to the manager to better define the process, improve quality and reduce costs. The question then is "Are these tools only available in TQL?", the answer is no. The tools are available in any management philosophy, the difference lies in the motivation and execution of the philosophy. Total Quality Leadership (TQL) is just that; a philosophy that enables all levels of the organization to be involved in the process. This is where TQL departs from the normal paradigms of western management philosophies.

The emphasis is not on the bottom line of profit, but rather on providing quality services and products to the customers. The TQL philosophy will not on its own save or cure an organization's problems the responsibility for which lies with management. The asset that TQL provides is a process by which decisions are made with knowledge of the process, not based on reaction. TQL will only work if there is commitment from top management in support of the philosophy.

The theories of TQL, however, are not limited to the ones mentioned in this thesis. There are numerous other methods or tools that can be incorporated in to the TQM/TQL philosophy. These tools and philosophies all deal with quality issues. One of the theories that most often is equated with TQM is SMED (Single Minute Exchange of Die, or setup reduction). This theory was developed by a Japanese engineer by the name of Shingo. The SMED process was developed for industrial use to reduce the setup time and decrease the associated waste of die changes. This method can also be used in the operational fleet where there is setup required prior to or during a process. The advantage of SMED is that it requires minimal cost and often will not require top management involvement.

Another method that is associated with TQM/TQL is synchronized operations (Just-in-Time (JIT)). The use of this method was seen in the case of Wing Ten. The ESC and QMB both adopted a policy of training the PAT teams when they were needed, vice training everyone in SPC tools. This can be classified as Just-in-Time Training. This form of training provides the highest return on the investment of time.

To train an individual and never allow that person the opportunity to apply what he or she has learned is waste [REF:11].

Other areas methods of improving quality that were developed for industry but have service applications include: Statistical Experimental Design Methods, Taguchi Methods, Poka-Yoke (mistake proofing of a process), Total Preventive Maintenance, and Group Technology and Quality Circles. All of these methods can be adapted into the operational fleet as well as shore establishments. The scope of quality methods is never ending as long as there is a need and innovation. This leads to the second question: "How does senior management shift the paradigms and transition the organization to the TQL philosophy?".

B. RECOMMENDATIONS

The following recommendations are presented as a guide to implementation of the TQL philosophy in the operational fleet. The adaptation of these eight points can assist in the transition to Total Quality Leadership.

1. Commitment of top management to the philosophy. This point is the key to success. It is top management that will control the culture of an organization. The senior leadership must lead the change if others are to follow.

2. Development of the Mission Statement and Guiding Principles. This step is crucial to create the constancy of purpose that is Deming's first point. These statements provide the direction and define the culture of the organization. These statements must be clear and include the entire scope of the organization.

3. Establish the Executive Steering Committee (ESC) and Quality Management Boards (QMB). Provide training to both and continue to increase the knowledge base.

4. The creation of a full time TQL coordinator. This cannot be a collateral duty. The scope of total quality is too large to be handled on a part time basis. The billet should be held for one year and special training should be sought for the individual selected[1]. This position requires the coordinator to facilitate training to all hands in the methods and theories of quality. This enables the development of corporate knowledge similar to the Aviation Safety Officer (ASO) in an aviation squadron.

5. Start the process improvements on a small scale. This will prevent the "false start". The PIM and other methods of process improvements should not be implemented until both the ESC and QMB's feel comfortable with the tools required for the process selected for improvement. Early small scale successes can create the vehicle of change. To start on a complex issue can lead to frustration and undermine the ability of top management to change the culture.

6. Develop and provide a professional library. This should include current literature on TQM/TQL. Case studies should also be made available to foster innovative ideas. The library should be accessible and use encouraged by all hands. A suggested reading list is provided in Appendix B.

7. Adapt the TQL philosophy to fit the organization. There is no set rules or constraints on the philosophy. Each organization should explore in the initial stages the methods and tools that are best suited for their organization.

8. Create a culture that fosters innovation. It is innovative ideas that will lead to improvements of processes.

The eight points listed above will allow an command to start the implementation of TQL and provide guides for success. This list is not all encompassing and other materials should be sought prior to implementing the philosophy. The key to success in TQL is knowledge.

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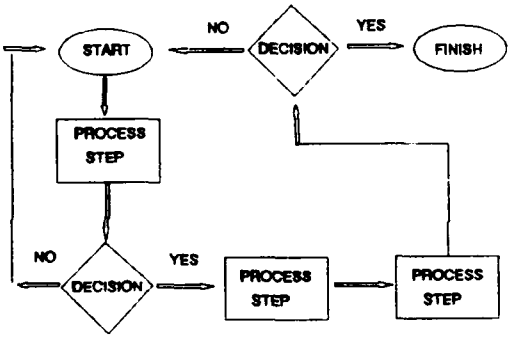
[1]The DON has created two TQL schools located in San Diego, CA and Little Creek, VA. The courses offer a wide variety of subjects on TQL. The schools are scheduled to start operating in June, 1992.

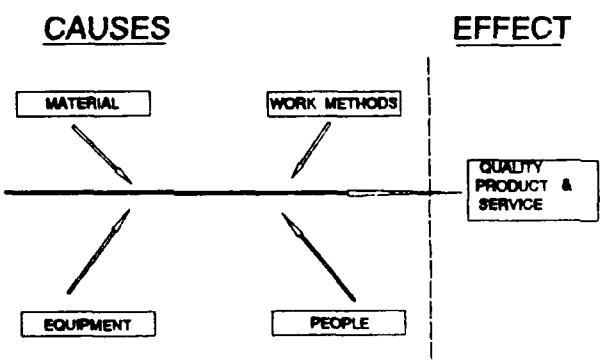
APPENDIX A SPC TOOLS

This Appendix contains the Seven Basic tools of Statistical Process Control (SPC) along with the Seven Management and Planning tools The Seven Basic tools are taken from the Senior Leadership Seminar Handbook. The Seven Management and Planning tools can be found in the *Memory Jogger Plus*, 1991.

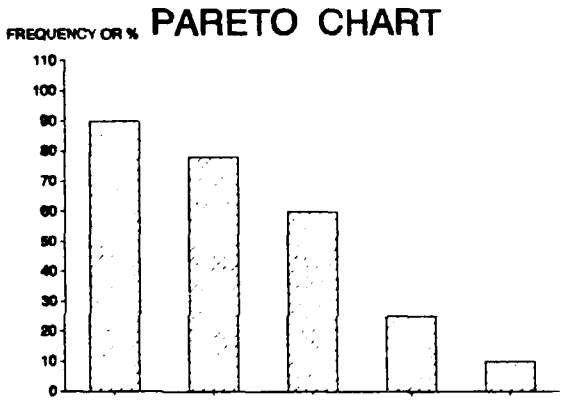
SEVEN BASIC TOOLS OF SPC



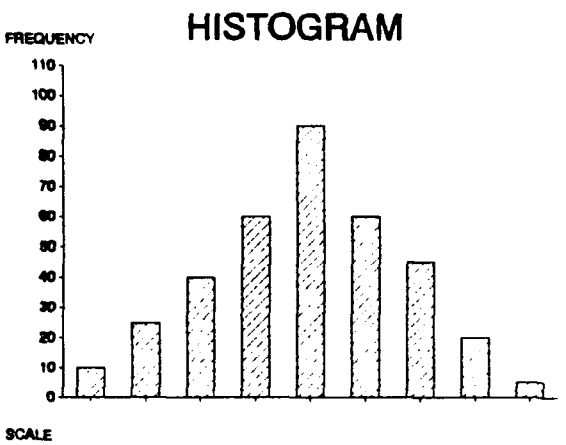
Flow Chart. This diagram displays the steps and activities in a process or a system and how they interact. This promotes understanding of the process. Flow Charts can be used to compare "actual" to "ideal" processes, it also allows the visual display of "value-added" steps in the process. This should be on of the first tools used.



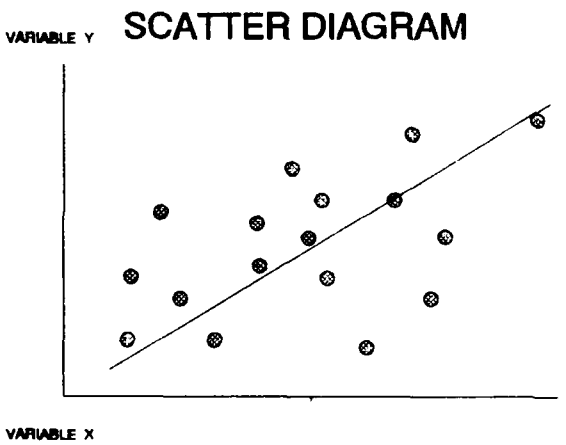
Cause-and-Effect Diagram. The Cause-and-Effect diagram shows relationships between causes and effects. It can be used to organize possible causes of variation, identify categories and sub-categories of causes. It can also provide a guide to data collection and identify both positive and negative effects on the process.



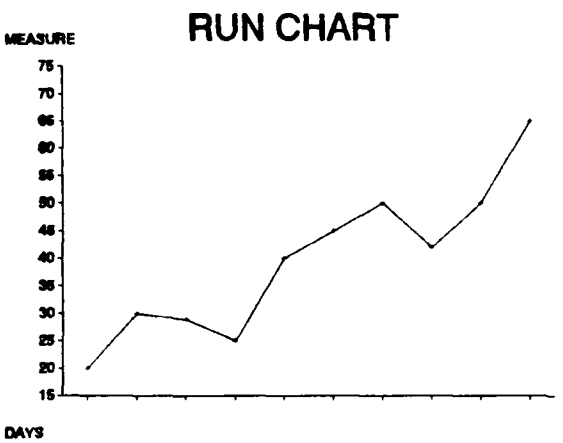
Pareto Chart. The Pareto Chart is a graphical representation of the categories in their order of magnitude. It provides a basis for selecting which "problems" to focus on initially. The ones with the largest effect on the system reflect a greater percentage. The chart can be used as a baseline for monitoring improvement results. The Pareto Chart also can provide employee feedback on the chosen indicators.



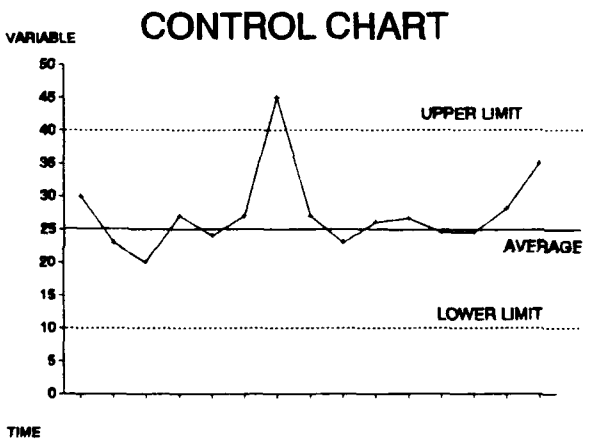
Histogram. The Histogram is the displayed distribution of measurement data over a selected scale. The Histogram revels the amount of variation that the process has within it. The Histogram is used to examine the effects of change on variation. It can also be used to compare results to specifications by adding these values to the graph.



Scatter Diagram. The Scatter Diagram displays the relationship between two variables that have been collected in pairs. This information can be used to predict how changes in one variable will affect the other. The Scatter plots can have a positive, negative, curve linear
or no slope at all. The slope indicates the effect that one variable has on the other

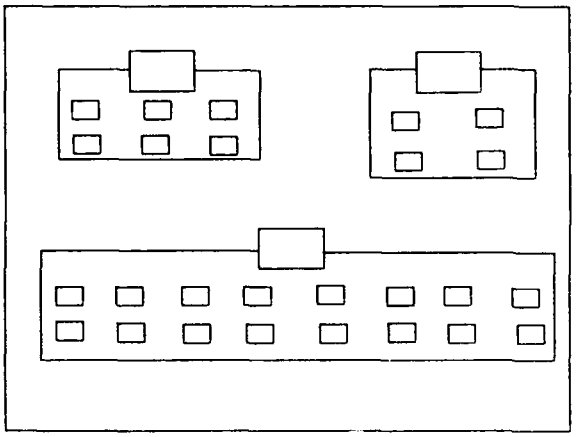


Run Chart. The Run Chart ia a line graph of the data plotted over time. This information is very useful in trend analysis of the process. The Run Chart can also be used to compare data groups over the same time period and revel patterns or trends. The Run Chart will also show the reaction to changes made to the process or system.

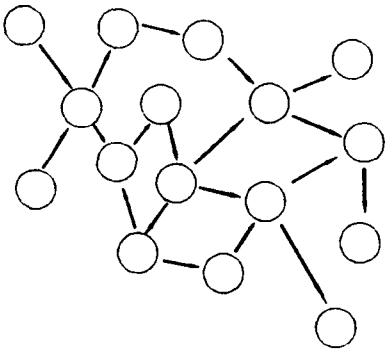


Control Chart. The Control Chart is a line or run chart that has statistically calculated limits from the data. These limits are not the specification limits, but the limits with respect to the variation. The Control Chart is best suited for showing when special cause variation is present in the process. The Control Chart is in control (or only shows common variation) when all points are within the upper and lower limits. The Control Chart is also a tool that can show process capability. The Control Chart is used for the following; identify sources variation, identify when changes need to be made, identify the primary responsibility for improvement and the relation of requirements.

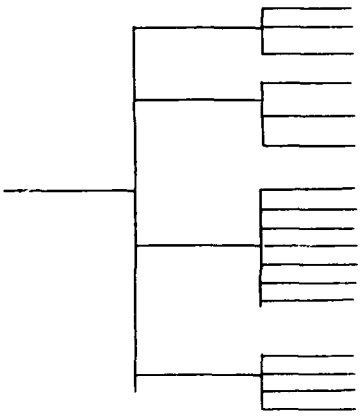
SEVEN MANAGEMENT and PLANNING TOOLS



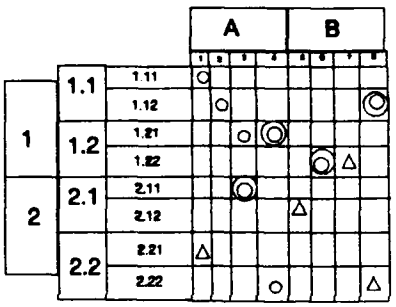
Affinity Diagram. This tool gathers large amounts of language data (ideas, opinions, issues, etc.), organizes it into groupings based on the natural relationship between each item, and defines groups of items. It is largely a creative rather than logical process.



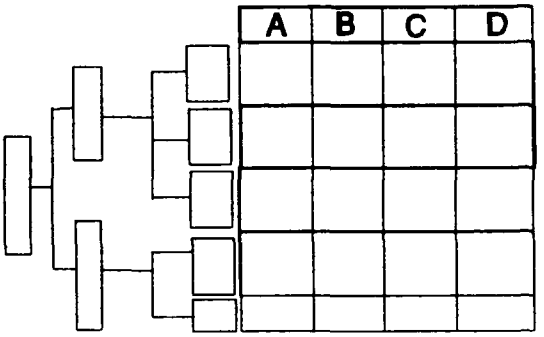
Interrelationship Digraph. This tool takes a central idea, issue, or problem, and maps out the logical or sequential links among related items. It is a creative process that shows every idea can be logically linked with more than one other idea at a time. It allows for "multi-directional" rather than "linear" thinking.



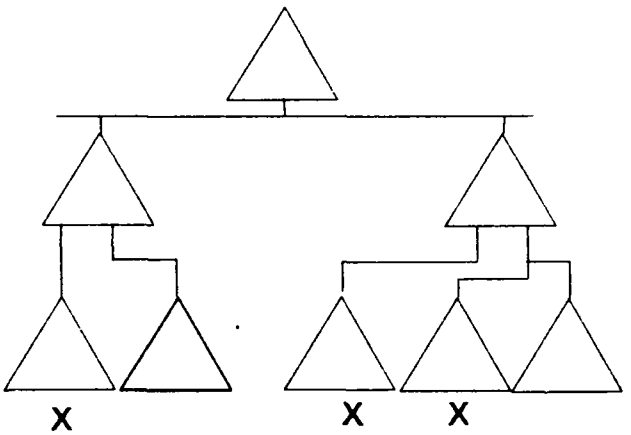
Tree Diagram. This tool systematically maps out in increasing detail the full range of paths and tasks that need to be accomplished in order to achieve a primary goal and every related sub-goal. It describes the "methods" by which every "purpose" is to be achieved. The Tree Diagram brings you from "Motherhood and Apple Pie" objectives to the nitty gritty details of implementation.



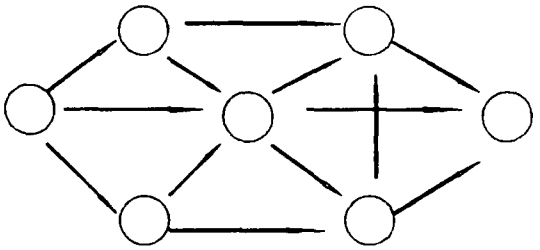
Matrix Diagram. This tool organizes large amounts of information such as characteristics, functions, and tasks into sets of items to be compared. By graphically showing the logical connecting point between any two or more items, a Matrix Diagram can surface relationships between items. Beyond the existence or absence of a relationship, it can also code each relationship to show its strength and the direction of the influence.



Prioritization Matrices. These tools priortize tasks, issues, product/service characteristics, etc., based on known weighted criteria using a combination of Tree and Matrix Diagram techniques. Above all, they are tools for decision making.



Process Decision Program Chart. Process Decision Program Chart (PDPC) is a method which maps out conceivable events and contingencies that can occur in any implementation plan. It in turn identifies feasible countermeasures in response to these problems. This tool is used to plan each possible chain of events that need to occur when the problem or goal is an unfamiliar one.

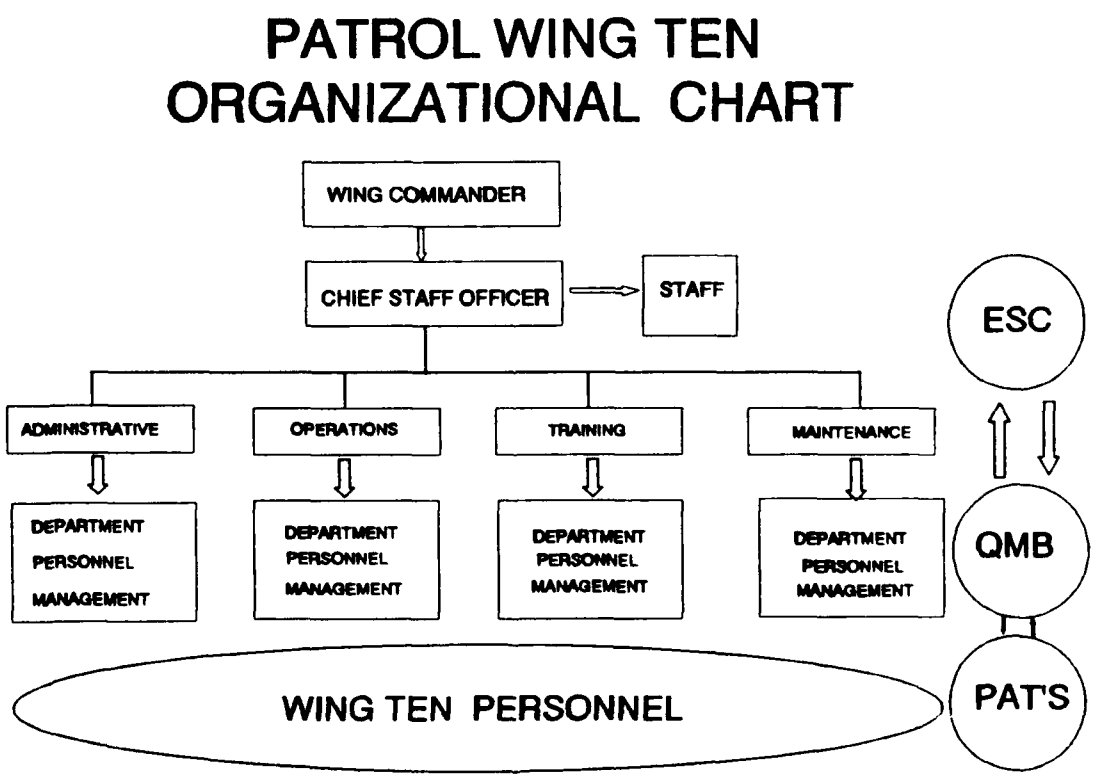


Activity Network Diagram. This tool is used to plan the most appropriate schedule for the completion of any complex task and all of its related sub-tasks. It projects likely completion time and allows monitoring of all sub-tasks for adherence to the necessary schedule. It is used when the task at hand is a familiar one with sub-tasks of known duration.

The Seven Management and Planning Tools are used by mature problem solving groups rather than by those just starting out. A team is not ready for the advanced tools until they are thoroughly trained in and utilizing the seven basic tools. [REF 12]

APPENDIX B DATA

This Appendix provides the data from Patrol Wing Ten's process improvement model. The Wing organizational chart, Mission Statement and Guiding Principles, and data collected from the QMB and PAT's for the TAD request process are enclosed. Also included is the Guiding Principles of the Department of the Navy, and a suggested reading list for implementation.



MISSION STATEMENT

Navy-wide implementation of Total Quality Leadership (TQL) is progressing at a measured pace. In the past few months the CNO, CINCPACTFLT, CNAP and COMPATWINGSPAC have published "Mission, Vision and Guiding Principles" statements that define how the Navy will operate under TQL (Refs A thru D are germane). Since Wing Ten operates within a well defined chain of command, the statements of our leadership represent a "shared mission and vision" that we must incorporate into Wing Ten specific mission, vision and guiding principles. Accordingly, in maintaining the constancy of purpose outlined in Refs A thru D, COMPATWINGTEN Staff Mission, Vision and Guiding Principles are provided to all members of Wing Ten Staff.

Our mission is to support COMPATWINGSPAC, CTF-12 and CTF-72 by directing the operational employment and conducting the at home training of non-deployed squadrons to ensure combat ready MPA forces are available to meet the requirements of the Unified Commanders. Wing Ten must ensure these MPA forces are fully trained, properly manned, rapidly deployable, interoperable, well maintained and supported.

Our vision is that the Unified Commanders will continue to require MPA forces, capable of rapid response, to forward deploy and conduct world wide multi-mission operations. Counter-Narcotics operations, ROW diesel submarine surveillance and CVBG coordinated operations will become increasingly more important.

The requirement for MPA to remain ASW capable against ex-soviet submarines will continue. Although Moffett base MPA forces (including Wing Ten) will be relocated or disestablished, PACFLT will continue to require MPA forces to be home based in the PACFLT AOR. As such, there will be migration of Wing Ten staff and squadron personnel to other MPA bases.

GUIDING PRINCIPLES

To accomplish our mission, Wing Ten Staff will be guided by the following principles:

- In a period of draw down, people, more than ever before, are our top priority. Training, retention, advancement and career progression of our quality performers are paramount concerns.
- We will accomplish our mission by teamwork.
- We will safeguard people, resources and the environment.
- We will encourage innovation and seek continuous improvement while maintaining tradition and the chain of command.
- To seek out more efficient ways to train and support our staff and squadrons, to eliminate waste and make the best use of our flight hours, people, aircraft, parts and other resources.
- Maintain a working environment and command climate that values teamwork, personal dignity, individual worth and equal opportunity.
- Foster an organization that encourages recognition and respect, and prohibits harassment and favoritism.
- Proactively work to integrate with Naval Reserve MPA forces to provide additional augmentation, greater contributory support and increased forward presence by reserve MPA forces.

- Provide stability in a time of change during the relocation and disestablishment of Wing Ten forces.

- We are committed to honesty, integrity and the highest standards of moral and ethical conduct.

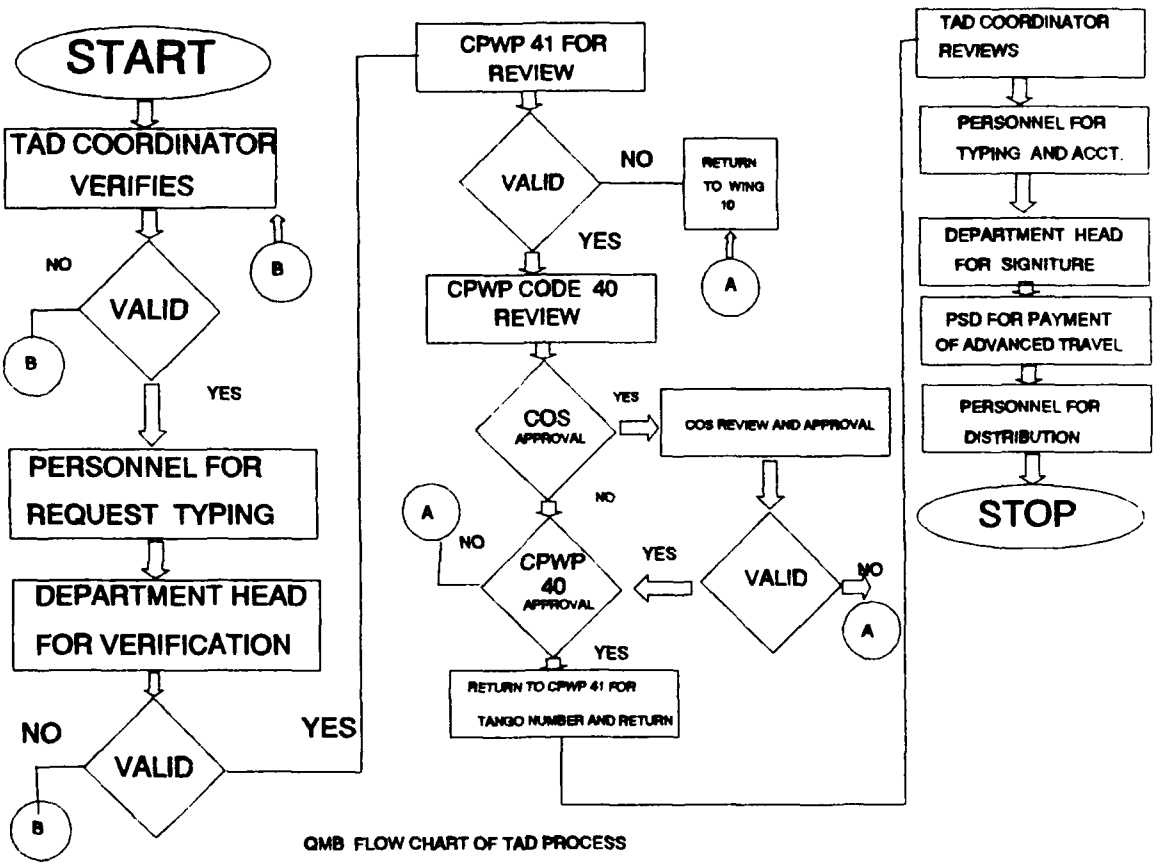
- We are committed to quality products and continuous improvement.

- We are committed to making decisions based on data and facts rather than parochialism and or personal biases.

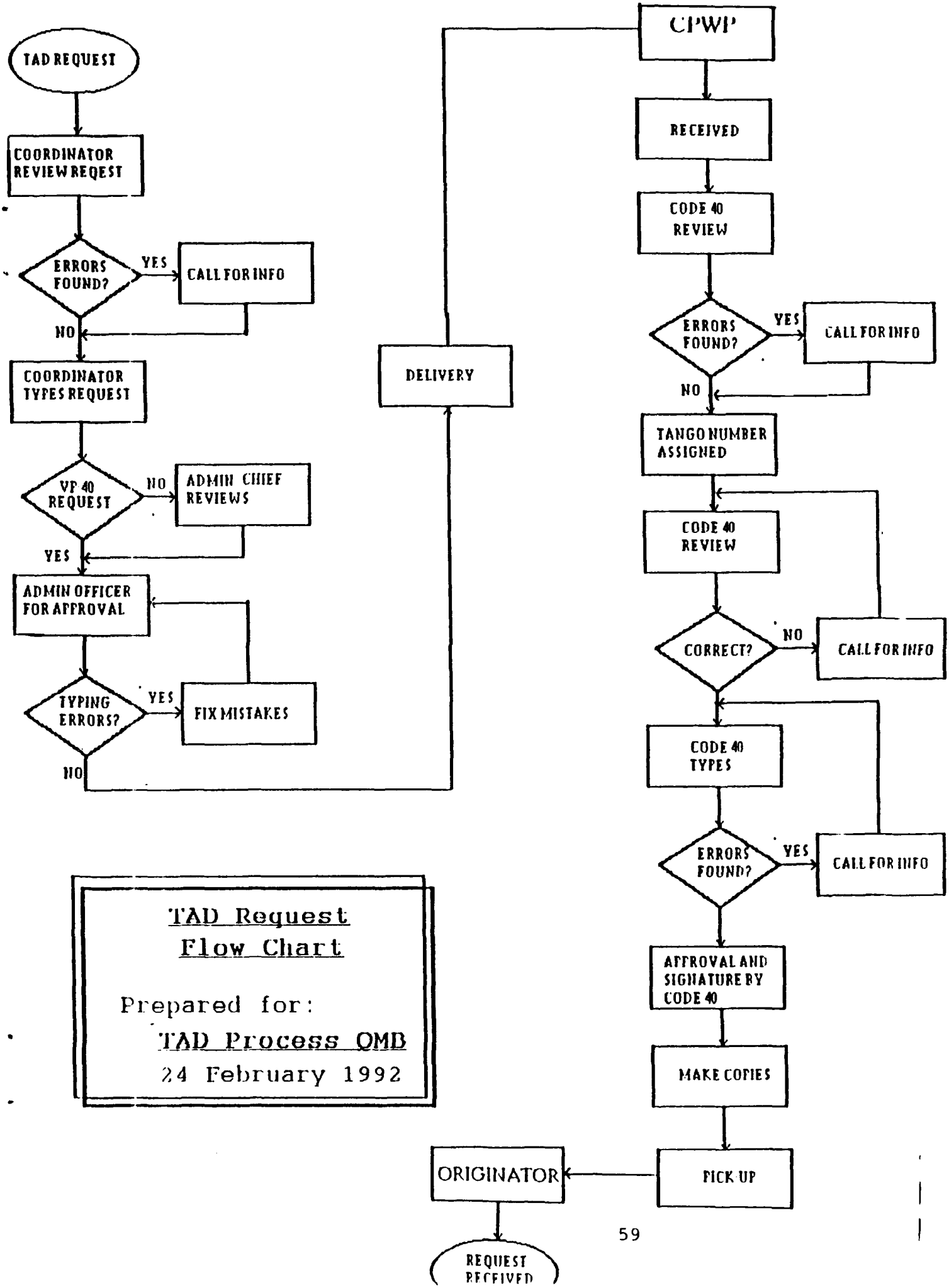
- We are committed to open and direct communications.

- We are committed to community (civilian and military) service.

The following two flow charts were constructed during stage one of the QMB's PIM. The first diagram is the QMB's view of the process, followed by the second diagram which is that of the PAT. The QMB's is how the process should run and the PAT's demonstrate the actual process.



QMB FLOW CHART OF TAD PROCESS


TAD REQUEST
COORDINATOR REVIEW REQEST
ERRORS FOUND?
YES
CALL FOR INFO
NO
COORDINATOR TYPES REQUEST
VP 40 REQUEST
NO
ADMIN CHIEF REVIEWS
YES
ADMIN OFFICER FOR APPROVAL
TYPING ERRORS?
YES
FIX MISTAKES
NO
DELIVERY
CPWP
RECEIVED
CODE 40 REVIEW
ERRORS FOUND?
YES
CALL FOR INFO
NO
TANGO NUMBER ASSIGNED
CODE 40 REVIEW
CORRECT?
NO
CALL FOR INFO
CODE 40 TYPES
ERRORS FOUND?
YES
CALL FOR INFO
APPROVAL AND SIGNATURE BY CODE 40
MAKE COPIES
PICK UP
ORIGINATOR
REQUEST RECEIVED
TAD Request
Flow Chart
Prepared for:
TAD Process QMB
24 February 1992

The data collection sheet on page 61, was developed by the PAT assigned to track the time required for a TAD request to go through the process. It was estimated by the QMB that a period of five days was required to process and return a request. The data revealed the following:

- The mean time for a request to be approved and returned was 13 days.
- The mean time the request was actually worked on was 20 minutes.
- The bottleneck of the process was found to be in two areas. The first area was transportation, second was in-basket waiting.

# REQUEST ______________	DAY/TIME OF ARRIVAL ______________

THIS IS A SURVEY DESIGNED TO HELP TRACK THE ROUTING OF TAD REQUESTS. AN ATTEMPT TO IMPROVE RESPONSE TIME, AS WELL AS SERVICE TO THE CUSTOMER IT IS REQUESTED THAT YOU FILL IN THE APPLICABLE INFORMATION AS THIS REQUEST PASSES YOUR DESK. CONTINUE TO FILL IN THE DATA UNTIL IT RETURNS TO THE ORIGINATOR FOR THE TYPING OF THE ORDERS:

LOCATION	REASON FOR STOP (CIRCLE)	DEPARTURE DATE/TIME	HOW TRANSFERED (CIRCLE)
	REVIEW REQUEST TYPE REQUEST DUTY DRIVER APPROVAL SIGN. CORRECT REQUEST ASSIGN TANGO # PICK UP		PUT IN BOX HANDCARRIED DUTY DRIVER
	REVIEW REQUEST TYPE REQUEST DUTY DRIVER APPROVAL SIGN. CORRECT REQUEST ASSIGN TANGO # PICK UP		PUT IN BOX HANDCARRIED DUTY DRIVER
	REVIEW REQUEST TYPE REQUEST DUTY DRIVER APPROVAL SIGN. CORRECT REQUEST ASSIGN TANGO # PICK UP		PUT IN BOX HANDCARRIED DUTY DRIVER
	REVIEW REQUEST TYPE REQUEST DUTY DRIVER APPROVAL SIGN. CORRECT REQUEST ASSIGN TANGO # PICK UP		PUT IN BOX HANDCARRIED DUTY DRIVER
	REVIEW REQUEST TYPE REQUEST DUTY DRIVER APPROVAL SIGN. CORRECT REQUEST ASSIGN TANGO # PICK UP		PUT IN BOX HANDCARRIED DUTY DRIVER

Page 63, is the TAD survey of TAD request customers. This was developed and processed by the PAT assigned to determine customer needs and complaints. The results of this survey are presented in a Cause & Effect diagram on page 64. A pareto chart could also be constructed from this data and provide management with more information to make decisions with.

COMPATWING TEN
TAD SURVEY

1. DID YOU FEEL COMFORTABLE IN FILLING OUT THE TAD REQUEST?

YES NO

IF NOT, WHY? _____

_____

2. WHAT CAUSED CONFUSION IN FILLING OUT THE FORMS?

_____

_____

3. WERE THE TAD REQUEST FORMS EASY TO UNDERSTAND?

YES NO

IF NOT, WHY? _____

_____

4. DID THE APPROVED ORDERS MEET YOUR TRAVEL REQUIREMENTS?

IF NOT,WHY? _____

_____

5. HOW LONG DID IT TAKE YOU TO FILL OUT THE REQUEST? _____

IF DELAYS OCCURED, WHAT CAUSED THEM? _____

_____

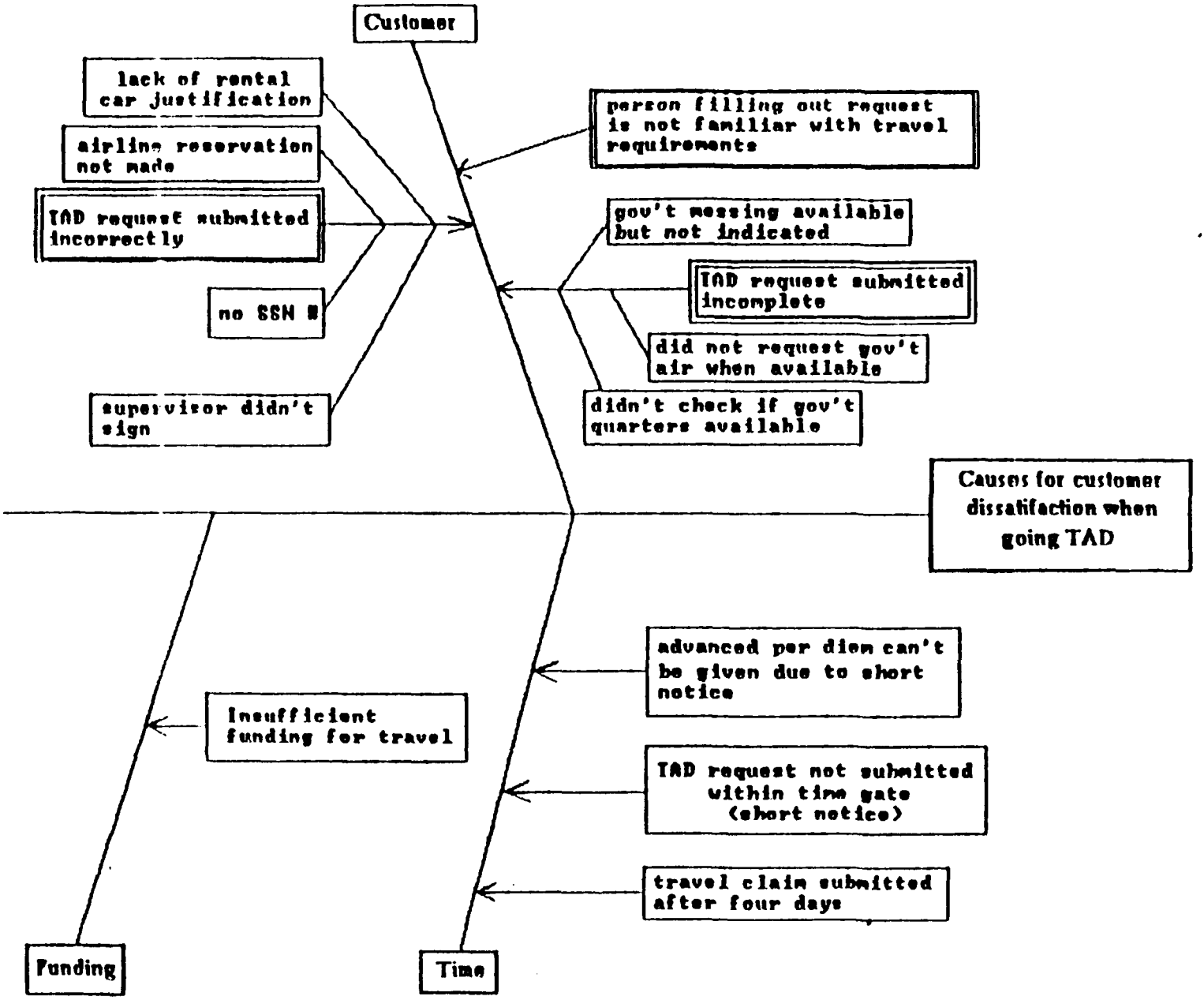
THANK YOU, FOR YOUR SUPPORT.

FOR TAD COORDINATOR ONLY

6. WERE THE TAD REQUESTS COMPLETE, ACCURATE AND EASILY DISCERNIBLE?

_____

_____



Cause and Effect Diagram of:
Causes for Customer Dissatifaction when going TAD

prepared for:

TAD Process QMB
09 March 1992

DEPARTMENT OF THE NAVY
STRATEGIC GOALS

We, the leaders in the Department of the Navy, will optimize the effectiveness of the Navy-Marine Corps team by leading our people and managing our systems as an integrated force within a quality-focused organization. We will work to influence our future by translating our vision, mission, and guiding principles into goals, strategies, and actions so that resources and improvements are aligned with the same intent.

We believe that everyone has a legitimate contribution to make in accomplishing these goals; Navy and Marine Corps; military and civilian; operational and support. In starting this translation, we have developed a vision and identified five major strategic goals for the Department of the Navy. These strategic goals are: Integration; Human Resources, Education, and Training; Acquisition; Innovation and Technology; and Facilities. We believe that continuous improvements in these areas are mandatory if the Department of the Navy is to meet the challenges that confront us.

The Department of the Navy will:

Integration

- operate a fully integrated Navy-Marine Corps team that will provide maximum operational capability, capitalizing on the synergism of our operating forces and our support establishment.

Specifically, the DON will:
- develop broad strategies and tactical doctrines that maximize naval service combat effectiveness within the framework of joint and combined operations of the National Military Strategy.
- create and maintain a consolidated naval acquisition, maintenance, and logistics infrastructure that is efficient and responsive to the building, support, and sustainability needs of our naval service forces.
- integrate the focus and efforts of staffs and management organizations to facilitate interaction; and educate our personnel, both military and civilian, in multiple disciplines that affect naval service capabilities and applications.

Human Resources, Education, and Training

- continuously improve the quality of our military and civilian work force through fact-based, innovative systemic changes affecting recruitment, training, and quality of life.

Specifically, the DON will:
- identify and remove the barriers to equal opportunity for all our people.
- improve the military recruiting system through better requirements determination, resource allocation, and day-to-day operations.
- improve determination of military training requirements, feedback systems, delivery of training to meet fleet requirements and foster student success; properly fund training and eliminate redundancies in the system.
- improve the civilian recruiting and hiring system through better requirements determination and resource allocation and by assessing national versus local recruiting responsibilities and needs.
- improve civilian training by improving requirements determination, training delivery, and by adjusting resources to match requirements.
- enhance the working environment to improve the performance of quality military and civilian personnel.

Acquisition

—continuously improve the acquisition process to achieve timely design, development, test, manufacture, and support of maritime weapon systems for our Navy-Marine Corps team.

Specifically, the DON will:

—reduce the time from concept definition to fleet introduction.

—stress reduced operating and support costs in all aspects of system design; field fully supported systems with emphasis on interoperability and operational availability.

—foster contractor/government working relationships, emphasizing teamwork built on trust, sound business practices, and the highest standards of ethical behavior. Ensure that an industrial capability for unique naval requirements is maintained.

Innovation and Technology

—continuously improve the process of identifying and introducing new technologies. Ensure our recognition as a world leader in key maritime technologies. Create a climate that fosters innovation and invention.

Specifically, the DON will:

—improve the process of selecting and evaluating technology opportunities; focus DON investment on those technologies that form the foundation of future Navy-Marine Corps system developments; introduce cost-effective technologies into our system as they become available.

—improve the interaction with our sister services, academia, industry and our allies to support the DON technology investment.

Facilities

—operate an adaptable and responsive shore facilities establishment that is properly sized and properly supported to allow continuous improvement in the quality of service to the operating forces; that consists of well-maintained and attractive facilities, resulting in improved living and working conditions and increased productivity at all its installations; and that consistently performs in an environmentally responsible manner and contributes to the quality of life in the communities of which it is a part.

Specifically, the DON will:

—define and implement "quality standards" for facilities that support mission requirements, family and bachelor housing, family support functions, and morale, welfare and recreational activities.

—provide the resources to achieve the defined quality standards over time and maintain the support establishment at these levels; in addition to traditional military construction, consider innovative financing and management arrangements (e.g., cost-sharing, public-private venture, leasing).

—integrate environmental awareness into all DON planning, management, and operations to comply with all applicable environmental laws and to protect the natural resources found on Navy and Marine Corps installations. Minimize waste, conserve energy, and adopt pollution prevention measures to avoid adverse impacts on the environment.

Our vision and associated strategic goals require a significant transformation throughout the naval services. By pursuing our vision, we believe we will enhance our ability to determine our future. Achieving these strategic goals will be neither quick nor easy; however, we believe that our people are capable of meeting the challenges confronting the Navy-Marine Corps team. We recognize that all members of the team have valuable contributions to make to our strategic efforts. As leaders, we will strive to provide the direction and support required for this transformation.

H. Lawrence Garrett III
Secretary of the Navy

Gen Carl E. Mundy Jr.
Commandant of the Marine Corps

ADM Frank B. Kelso II
Chief of Naval Operations

SUGGESTED READING LIST

The reading list provided is a collection of materials that have to deal with the improvement of quality and how management can direct the change to TQL. The list is broken up into two categories, A. Management Theory and B. Statistical Tools and Methods.

A. MANAGEMENT THEORY:

1. Deming, W.E., Out of the Crisis, 1986, MIT, Cambridge MA.
2. Walton, Mary, The Deming Management Method, 1986, Dodd Mead, NY,NY.
3. Walton, Mary, Deming Management at Work, 1990, Putnam's & Son.
4. Imai, M., KAIZEN; The Key to Japan's competitive Success, 1986, Magraw Hill, NY,NY.
5. Juran, Leadership for Quality, 1989, Magraw Hill.
6. Stalk, Hout, Competing Against Time, 1990, Free Press.
7. Peters, Waterman, In Search of Excellence, 1982.
8. Pyzdek, Thomas, What Every Manager Should Know About Quality, 1991, Marcel Dekker,inc.
9. Poka-Yoke, 1987, Productivity Press.

B. STATISTICAL METHODS:

1. The Memory Jogger Plus, 1991, Goal/QPC.

2. Scholtes, Peter, The Team Handbook, 1988, Joiner Asso.

3. Gitlow, Gitlow, Oppenhiem, Oppenhiem, Tools and Methods for the Improvement of Quality, 1989, Irwin.

4. Barker, T., Quality by Experimental Design, 1985, Marcel Dekker.

5. Rawjit, Roy, A Primer on the Taguchi Method, 1990, Van Nostrand Reinhold.

APPENDIX C SUPPLEMENTAL CASE STUDY

AN APPLICATION OF TQL TO WEAPON SYSTEMS TRAINING

The purpose of this case is to show how application of the TQL philosophies can lead to process improvement. This subject is common to all operational commands. Through application of SPC, new knowledge of a process can be obtained and improvements made.

Training plays a vital role in today's Navy. Training is also fundamental to TQL. Dr. Deming, in his book Out of The Crisis, devotes an entire chapter to the subject of training. In this chapter (Chapter 8), Deming writes;

> "It is obviously of the utmost importance to train new people, when they come on to a job, to do the job well. Once learning curves level off, a control chart will indicate whether and when a person has reached the state of statistical control. When he reaches it, continuation of training by the same method will accomplish nothing. Curiously, if a man's work has not yet reached statistical control, further training will help his."

Through the use of control charts, this case presents an example of a process in the operational fleet that is a classic candidate for quality management.

A. Background

The focus of this case is the Weapons Systems Training (WST) used at Naval Air Station (NAS) West Coast. The facility houses the WST, a simulator used to train tactics to aircrew. The WST is a complete mock up of the Aircraft Weapon Systems and all stations operate as they would during an active flight. This training is accomplished at a significantly lower cost than actual flight time. The WST operates four periods per day, with the first two used primarily for qualification runs while the second two are typically training sessions.

B. The Process

There are several phases to the WST training mission that are parallel to an actual aircraft mission. Crews will arrive approximately one hour prior to the expected start time to receive a brief on the mission that will be conducted during the WST period. Missions will last a minimum of two hours and a maximum of three hours depending on the type of mission. The second phase is the "Pre-Flight" of the WST by the aircrew to ensure all gear is operating as it should.

The third phase is the mission itself. This can be broken down into several events. The first event is that of the transit to the assigned search area. This normally lasts between 10-30 minutes to allows the crew to become settled in and feel as if they are on a actual flight.

The second event is the search. During the search, the aircrew display and use given tactics to gain contact on the Target of Interest (TOI). Once contact is gained and the TOI is identified as such, the third and fourth events begin.

These are known as the Localization and Tracking phases. Depending on the mission, there are certain time and procedural tolerances that are assigned to these phases. Instructors note the time of classifications of TOI and then measure the time taken to locate the TOI and refine it's position to within a specified distance. This time is also called and noted by the aircrew. The aircrew is continuously tracking the TOI to develop course, position, and mission related information. This is monitored and pursued until the course, speed and position of the TOI are refined to an ever tighter tolerance.

With the gaining of this information the crew will transition into the final phase of attack. The criteria for attacking a TOI and tolerance that the crew must obtain in order to attack is part of the grading standard for the event. Figure 1 is a detailed flow chart of the entire process.

C. Data Collection and Analysis

Data was collected on a single trainer over ten days with the trainer operating 4 periods per day. The data was determined to be variables type data and the X-Bar Range control chart was chosen to track the process. Range (R) will track the process variability as a measure of dispersion between the highest and lowest values within the subgroup. X-Bar, the subgroup average, will chart the process location by identifying the mean value of the process for each subgroup.

The data is depicted in tabular form (FIG 2). The first control chart for data group "A" compares the four periods. Both the X-Bar (FIG 3) and Range (FIG 4) charts gave no indication of the process being out of control.

The data was then control charted to compare values between the ten days, data group B. The X-Bar data is charted (FIG 5) but not considered because the Range being in control is prerequisite to analyzing the X-Bar data. The range had one point, day six, out of control as it was exceeding the Upper Control Limit (UCL) (FIG 6).

D. Action

Day six was investigated and found to have a special cause variation. The crew that performed in training mission four for that day had the unusual composition of having all brand new aircrew members. The schedule is typically written to avoid this situation, but a last minute crew member swap created the anomaly. Once the special cause variation was identified the proper steps were taken to remove the occurrence. For the purpose of this case, the special cause variation was removed by eliminating day six from the data (see FIG 2, "Sample Data Run 2"). In real life the special cause variation would be removed by splitting up the inexperienced crew members and assigning each of them to a different aircrew comprised of more seasoned aviators.

After the source of this special cause variation was removed, the data was again control charted. As expected, both the X-bar (FIG 7) and the range (FIG 8) for the group "A" data were sill within limits and there was no indication of the process being out of control.

When the "B" group data was re-charted, the process was again found to be in statistical control, ie., no points were found to be outside the control limits. (Because the source of the special variation was removed, this is exactly what was expected.) Once the Range chart (FIG 10) was analyzed and found to be in control, the X-bar chart (FIG 9) was constructed and analyzed. This chart was also found to be in control.

The training department, which operates the WST, can be confident that the process is in statistical control. However, continued vigilance is required to uncover any future sources of special cause variation. It is also of utmost importance for them to maintain their efforts towards continuous improvement now that the process is in statistical control.

E. Conclusions

The primary goal of the application of the TQL philosophy is continuous improvement of a process. Through identification of special cause variation in the WST process using control charts, the management of the training facility has taken the first step on the road to quality improvements. But it is only that... A FIRST STEP.

The Training Department must now continue to use these tools in the ever present quest to improve the process and reduce common cause variation. The goal is to establish a stable process, ie., the management of the WST will enjoy several advantages if they are able to achieve and maintain a stable process,with as little variation as possible.

First, they will know the process capability and they will be better able to predict aircrew performance and quality levels. At the same time they will be more likely to

maximize productivity. Through the continued use of control charts the WST management will be able to measure the effects of changes in the system with greater speed and reliability. Finally, if the Training Officer elects to change the required performance limits, he will have the data to back up the decision.

The primary lesson learned from this case is that the tools and philosophies of TQL, when applied to Naval processes can be extremely effective. Training is one of the foundations of the Deming philosophy and is particularly important in many of the skills practiced in the Navy. The real challenge is to develop **new and innovative** training methods after a stable process has been achieved. Only then will the Navy embark upon the journey of continuous improvement.

FLOW DIAGRAM FOR WEAPON SYSTEM TRAINER

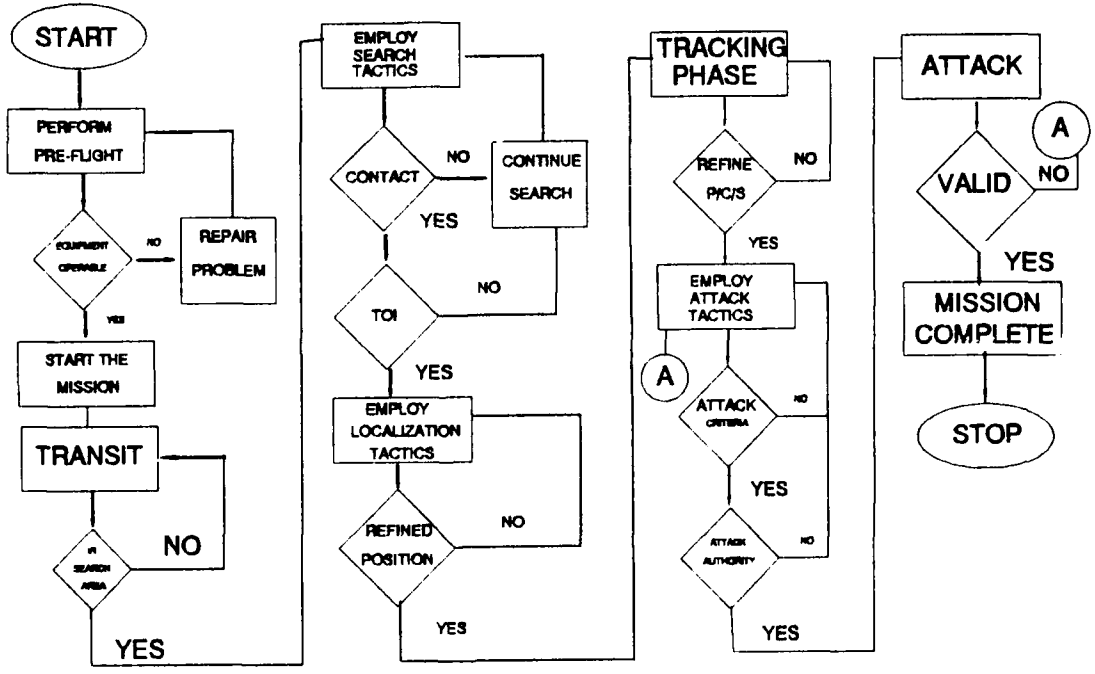


FIGURE 1

PERIOD				
DAY	1	2	3	4
1	50	100	150	150
2	40	150	65	100
3	180	30	150	110
4	100	75	250	200
5	125	15	110	40
6	75	105	85	350
7	90	95	145	275
8	80	200	200	135
9	125	160	165	300
10	75	40	100	120

'A' GROUP OF DATA				
Xbar	94	97	142	178
R	140	185	185	310

Xbarbar	127.75
Rbar	205
UCL(x)	190.89
LCL(x)	64.61
UCL(r)	364.285
LCL(r)	45.715

'B' GROUP OF DATA

Xbar	R
112.5	100
88.75	110
117.5	150
156.25	175
72.5	110
153.75	275
151.25	185
153.75	120
187.5	175
83.75	80

Xbarbar	127.75
Rbar	148
UCL(x)	235.642
LCL(x)	19.858
UCL(r)	262.996
LCL(r)	33.004

FIGURE 2

SAMPLE DATA RUN 2 (SPECIAL VARIATION REMOVED)

PERIODS				
DAY	1	2	3	4
1	50	100	150	150
2	40	150	65	100
3	180	30	150	110
4	100	75	250	200
5	125	15	110	40
7	90	95	145	275
8	80	200	200	135
9	125	160	165	300
10	75	40	100	120

'A' GROUP OF DATA				
Xbar	96.11	96.11	148.33	158.89
R	140.00	185.00	185.00	260.00

Xbarbar	124.86
Rbar	192.50
UCL(x)	189.73
LCL(x)	59.99
UCL(r)	349.58
LCL(r)	35.42

'B' GROUP OF DATA

Xbar	R
112.50	100
88.75	110
117.50	150
156.25	175
72.50	110
151.25	185
153.75	120
187.50	175
83.75	80

Xbarbar	124.86
Rbar	140.63
UCL(x)	227.38
LCL(x)	22.35
UCL(r)	249.89
LCL(r)	31.36

X-BAR GROUP A

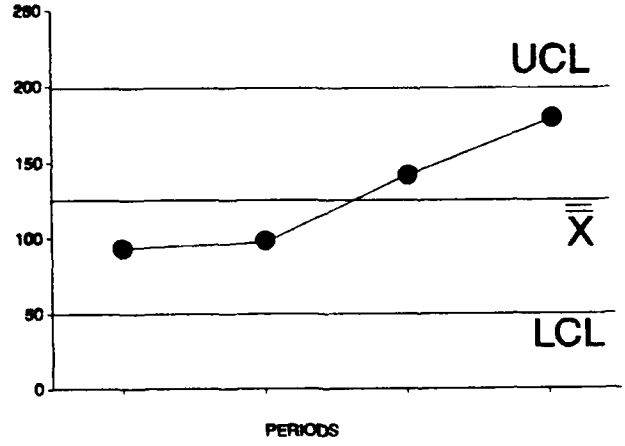


FIGURE 3

RANGE GROUP A

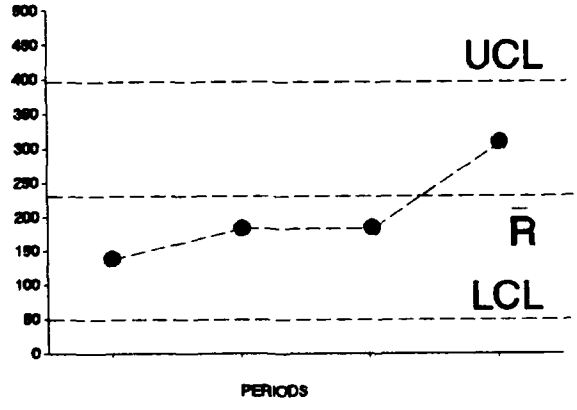


FIGURE 4

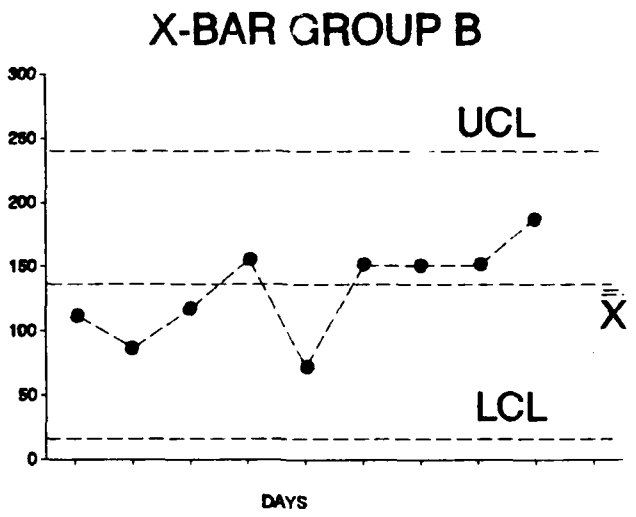


FIGURE 5

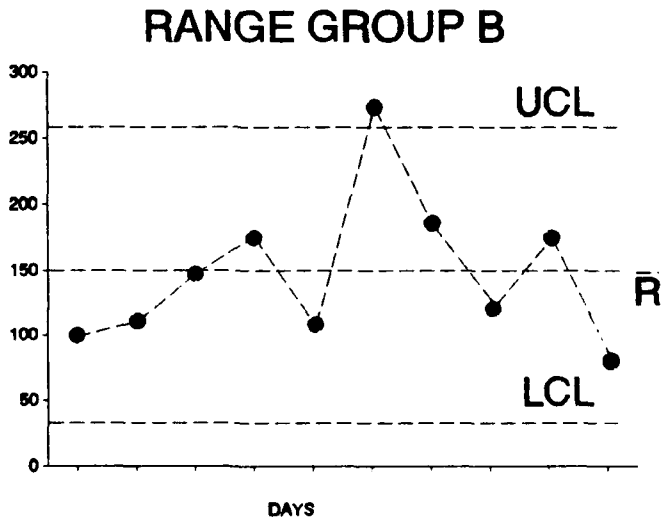


FIGURE 6

X-BAR GROUP A2

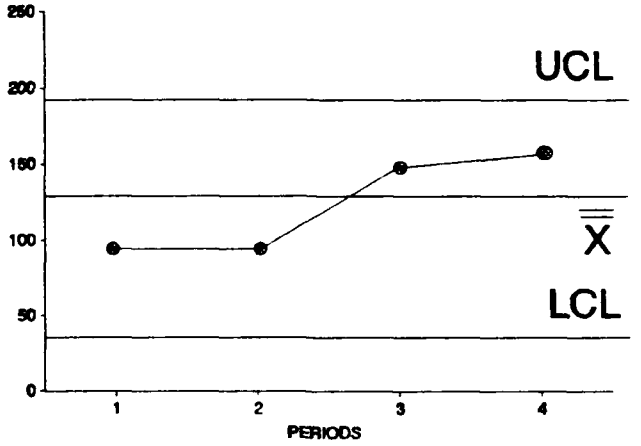


FIGURE 7

RANGE GROUP A2

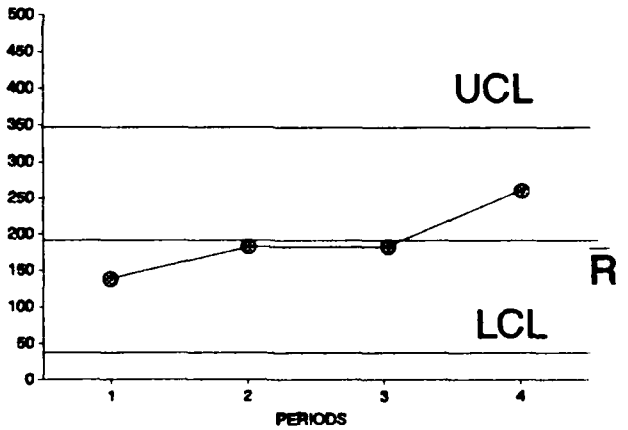


FIGURE 8

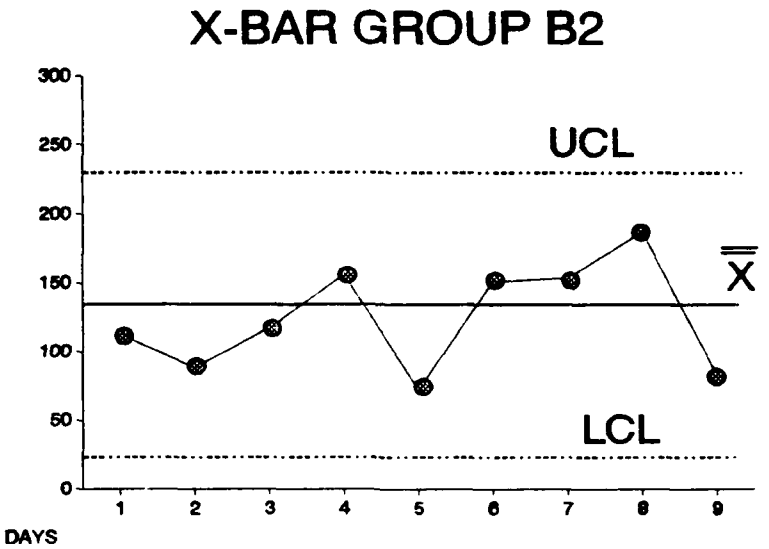


FIGURE 9

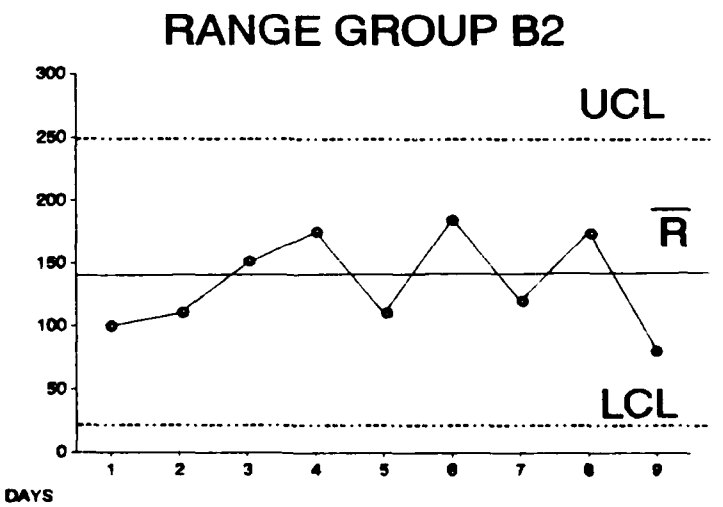


FIGURE 10

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